



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 21 2000

REPLY TO THE ATTENTION OF: SE-5J

ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action approval at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief *R. Karl*
Emergency Response Branch

I. PURPOSE

The purpose of this action memorandum is to request and document approval to expend up to \$898,200 to conduct a time-critical removal action at the Western Mineral Products Site located in Minneapolis, Hennepin County, Minnesota. Specifically, the proposed removal action will address the contaminated residential properties surrounding the industrial portion of the site.

This removal action addresses the need to mitigate the threats to the local population and the environment posed by fibrous amphibole asbestos that was released into the environment from the industrial portion of the site as a result of the processing of vermiculite ore and disposal of associated waste products. High concentrations of amphibole asbestos posing a public health threat have been detected on and in the areas surrounding the former Western Mineral Products/W.R. Grace property and on the adjacent Electramatic property. These properties are herein referred to as the industrial sites. Also, high concentrations of amphibole asbestos have been detected in the residential areas (residential sites) surrounding the industrial sites.

The proposed removal action will address immediate health threats identified in the residential areas during EPA's sampling in Northeast Minneapolis which occurred from March through



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August 2000. EPA plans to conduct further sampling at the residential sites which surround the industrial site and in other areas that may have been impacted by the vermiculite processing operations at the Site. This subsequent sampling, analysis and evaluation may identify additional time-critical threats at other residential sites.

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

The industrial sites are located at 1720 Madison Street N.E. and 1815 Jefferson Street N.E., Minneapolis, Hennepin County, Minnesota, and are bordered on the east by Burlington Northern Santa Fe railroad tracks, on the north by commercial buildings and west by residential properties and a city maintenance facility, and on the south by a commercial building.

The industrial sites consist of two parcels of land, one currently owned by Madison Complex, Inc. and the other currently owned by Electramatic, Inc. The site is occupied by a three-story brick office building, a brick warehouse structure, two four-story silos, and the Electramatic building to the north. The remaining portions of the industrial sites are parking lots and an abandoned section of 18th Street that divides the two parcels of land. The abandoned section of 18th Street is now owned by Electramatic and Madison Complex.

Western Mineral Products Company, a Minnesota company, operated at 1720 Madison Street N.E. as an independent company from 1946 to 1966. During part of this time it was a licensee of the Zonolite Company, a Montana Company. W.R. Grace acquired the Zonolite Company through a merger on April 16, 1963. The property at 1720 Madison was sold by W.R. Grace to Madison Complex, Inc, on October 24, 1989 by deed dated September 29, 1989. Allegedly, in 1990, W.R. Grace removed all materials that were stored in the two silos. The property at 1720 Madison is currently leased to Panel Specialties, Inc.(PSI), which manufactures prison furniture and security equipment on the property.

The Western Mineral Products Site at 1720 Madison Street N.E. processed vermiculite

ore that was shipped from the mine in Libby, Montana. The vermiculite ore body in Libby, Montana also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

At the mine in Libby, Montana, the vermiculite ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products.

The Western Mineral Products site in Minneapolis, Minnesota received Libby ore by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process contained high concentrations of amphibole asbestos. This waste product, also known as "Stoner Rock", was placed outside the building in a pile and was labeled as "Free Crushed Rock". The residents in the neighborhood were encouraged to take the waste material to use as fill on their properties. Residents hauled the "Free Crushed Rock" to their homes in their pickup trucks and cars. Allegedly the asbestos contaminated material was place in yards, gardens, sandboxes, and barbecue grills. This practice may have occurred for more than 40 years.

B. Removal Site Assessment

Between February and August 2000, the U.S. EPA Emergency Response Branch conducted site assessment activities to determine the potential health threat posed by amphibole asbestos-containing wastes which were produced at the former Western Mineral Products/W.R.Grace facility at 1720 Madison and deposited outside the plant and on residential properties in the surrounding neighborhood.

As part of a national evaluation of facilities that received vermiculite ore from the Libby,

Montana mine, the U.S. Environmental Protection Agency (EPA) Region 5 Emergency Response Branch conducted an initial site visit on February 2, 2000. The initial investigation consisted of a brief inspection and sampling of the former processing building and property, and interviews with State and local officials and some members businesses operating in the area.

During the investigation EPA observed exfoliated vermiculite insulation inside the building in a ceiling area on the first floor. Also, there was visible vermiculite in the surface soils around the building. Samples were collected from these areas and were analyzed using polarized light microscopy (PLM) and transmission electron microscopy (TEM). These samples indicated trace amounts of asbestos at concentrations less than 1% by visual estimate. On April 13, 2000, U.S. EPA returned to the site to perform additional of the surface soil and indoor insulation. While the indoor samples did not detect any asbestos, the three soil samples indicated levels between 2 % and 20 % asbestos. This finding triggered additional investigatory work and also a public meeting at the nearby armory in Northeast Minneapolis on April 13, 2000. At public meeting the local residents and the news media were updated on the national and local investigation of the vermiculite sites associated with the Libby, Montana mine. At the public meeting many residents expressed their concern with the adverse health effects associated with the Western Mineral Products site. Many of the former workers from the Site have contracted asbestosis or mesothelioma, both asbestos-related diseases.

These findings led EPA to initiate a residential property investigation with the following goals:

1. Visually identify asbestos contamination in alleys and yards;
2. Sample and analyze residential areas for asbestos;
3. Conduct door-to-door community outreach to determine the extent of contamination in the residential areas around the site.

In June and July 2000, the EPA collected soil samples from alleys in the residential areas as part of the residential investigation and extent of contamination study (See Figure 1). Visible amphibole asbestos was observed and confirmed through laboratory analysis in the alleys and adjacent yards. Concentrations of asbestos as high as 95% were confirmed in samples taken from the concrete surface of the alleys. Because the Stoner Rock waste material was made readily available to the general public, EPA expects that other contaminated residences will be identified.

It has been the experience of EPA Region 8 that laboratories that were contracted to perform this analysis reported some difficulty in reading the samples due to the matrix and

Western Mineral Site

Vicinity of 1720 Madison Street NE

Minneapolis, Minnesota

Legend

- Grab Samples August 1-2, 2000
- Grab Samples June 20-22, 2000
- Visually Inspected August 1-2, 2000
- Industrial Site

N



0.2 0 0.2 0.4 Miles



Preliminary Map
Coordinate System
UTM Zone 15, NAD 83

Sample Locations for August 1-2, 2000
supported by GPS Locational Data

the long thin nature of the amphibole asbestos. As a result labs indicated that they were likely under reporting asbestos concentrations.

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the National Contingency Plan (NCP). Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Characteristics of amphibole asbestos that are of concern are in the range of greater than 5 microns in length and have an aspect ratio of greater than 5 to 1.

C. Community characteristics

The Environmental Justice (EJ) Analysis indicated that the site is located in census tract 0025, block group 1, with a population of 376. To meet the EJ concern criteria, the area within 1-mile of the site must have a population that is twice the state low income percentage and/or twice the state minority percentage. For this site, the area must be at least 54% low-income and/or at least 12% minority. At this site, the low-income percentage is 55.1%, and the minority percentage is 19.7%. Therefore this site does meet the region's EJ criteria based on demographics as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998".

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to residents exists through direct contact and subsequent inhalation of amphibole asbestos which is currently in the alley's and yards of residential properties around the Site. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances; The large concentrations of asbestos found in the residential alley's and in surface soils in yards indicate that the human exposure

pathway exists. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

Given the occurrences of documented cases of asbestos related disease and death associated with handling of the ore, vermiculite product, and wastes from the Western Mineral site, it is reasonable to conclude that this known exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist (see Attachment 3).

(iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate; Vermiculite and pieces of amphibole asbestos are visible at the surface at both the industrial site and residential sites. Surface soils at both the industrial and residential sites contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures. Contaminated soils can easily be tracked into buildings or off the contaminated properties by truck, automobile, bicycle, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated surface soils. Rainfall and snow melt would also tend to wash the fibers off of the residential yards onto the adjacent alley's and to the nearby streets and sewers where they could also become airborne.

There is documentation that in the past, area residents would remove bulk waste vermiculite that had been abandoned by Grace at the industrial site to use as fill around their homes. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the area around the site and possibly on residential sites in the suburbs surrounding Minneapolis. Residents and newspaper reports indicate that from the 1940's through the 1980's children in the neighborhood played in the large pile of waste vermiculite that was labeled "Free Crushed Rock" by W.R.Grace.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund

sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994).

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; The warmer temperatures and dry weather typical in the summer and fall months in Minneapolis will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further from the yards to the alley's to the streets.

(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release; No other Local, State, or Federal agency is in the position or currently has the resources to independently implement an effective response action to address the on-going threats presented at the residential sites. EPA will conduct its actions in cooperation with State and local authorities. The Minnesota Pollution Control Agency (MPCA) is the lead oversight agency for the cleanup of the industrial site under their voluntary cleanup program.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous nature of minerals found at the Western Mineral Products Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former plant workers, their families, and to nearby residents with no known occupational or family connection to the vermiculite processing operations in Minneapolis. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions are outlined below. The removal will involve the following:

- a. Develop and implement a site health and safety plan;
- b. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- c. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alley's;
- d. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- e. Remove and dispose of asbestos from the surface of the paved alley's and driveways;
- f. Perform personal air sampling and ambient air sampling during remediation activities;
- g. Implement engineering measures to control dust during the cleanup;
- h. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- i. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- j. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. This project is estimated to take 40 days to complete assuming that 30 residential properties require remediation.

For the purposes of this initial removal action, cleanups will be initiated at properties with asbestos contamination levels of 1% or greater. Surface soils with detectable levels of contamination will be removed. The excavation depth will be approximately 18 inches.

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for

post-removal site controls at the disposal site to ensure the long-term integrity of the removal. EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

As this cleanup is being conducted as a Time-Critical Removal Action, all Federal and State ARARs may not have been identified at this time. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for piles of unexpanded vermiculite, contaminated soils, or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during this Removal Action.

B. Estimated Costs

The following cost estimates include costs associated with the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated anticipating that the project will need to be performed as a fund lead action. The costs do not include any past or future investigation costs on the Site. Costs are projected as follows:

EXTRAMURAL COSTS

| | |
|------------------------------|------------|
| Cleanup Contractor Costs | \$ 645,000 |
| Contingency (15%) | \$ 96,750 |
| Subtotal | \$ 741,750 |
| START | \$ 30,250 |
| Extramural Subtotal | \$ 772,000 |
| Extramural Contingency (10%) | \$ 77,200 |
| TOTAL, EXTRAMURAL COSTS | \$ 849,200 |

INTRAMURAL COSTS

| | |
|--|-----------------------|
| U.S. EPA Direct Costs \$30 x (500 Regional Hours + 50 H.Q. hours) | \$ 16,500 |
| U.S. EPA Indirect Costs \$65 x 500 Regional Hours | \$ 32,500 |
| TOTAL INTRAMURAL COSTS | \$ 49,000 |
| TOTAL PROJECT CEILING | \$ 898,200 |

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected initial Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommended. The total project ceiling, if approved, will be \$ 898,200. Of this, \$ 818,950 may be used for cleanup contractor costs. You may indicate your decision by signing below.

APPROVE:

for


William E. Muno, Director
Superfund Division

Date:

7/21/00

DISAPPROVE:

William E. Muno, Director
Superfund Division

Date:

Attachments:

- Figure 1 - Site and Residential Sample Location Map
- Attachment 1 - Cleanup Contractor Costs
- Attachment 2 - Administrative Record Index
- Attachment 3 - EPA Toxicologist's Memorandum
- Attachment 4 - Confidential Enforcement Attachment
- Attachment 5 - Environmental Justice Analysis

Vermiculite Processing Operations in Northeast Minneapolis

Update from the Minnesota Department of Health

September 2000

Vermiculite, Zonolite, and "Stoner Rock"

Vermiculite is a naturally-occurring mineral used in insulation, construction, and gardening products. Processed vermiculite (sometimes sold under the name "Zonolite") has been primarily made from ore mined in Libby, Montana by the Zonolite/W.R.Grace company. In fact, from 1924 to 1990, most of the world's supply of raw vermiculite ore came from Libby. This ore is now known to contain tremolite, a form of asbestos fiber.

Ore from the Libby mine was shipped to many processing plants around the country, including several plants in Minnesota. From about 1938 to 1988, ore from the Libby mine was processed at the Western Mineral Products plant located at 1720 Madison St. NE in Minneapolis. Beginning in the 1960s, this plant became part of the W.R. Grace company. At this plant, raw vermiculite was heated until the moisture trapped in the ore caused it to pop, in a manner similar to that of popcorn. After going through this "exfoliation" process, the vermiculite had a porous structure, making it suitable for insulation.

Most testing to date has shown that the Zonolite product used for insulation has less than 1 percent asbestos. Building materials with more than 1 percent asbestos are regulated due to health concerns.

In addition to the vermiculite product, the exfoliation left waste rock (known as "stoner rock" and "crush rock") that also contains asbestos fibers. Recent analyses of some samples at the former Western Mineral Products/Grace plant have found up to 20 percent asbestos in this waste rock. The sampling results of the "stoner rock" indicate that this waste material may contain a concentration of asbestos fibers greater than the vermiculite product "Zonolite."

Health risks

It has been known for many years that workers exposed to asbestos have suffered from asbestos-related diseases. In addition to lung cancer, asbestos exposure can also cause a rare type of cancer known as mesothelioma, which affects the lining around the lungs and abdomen.

It can also cause a type of permanent lung damage known as asbestosis, which causes shortness of breath and increases the risk of serious lung infections.

More recently, serious concerns have been raised about a high prevalence of asbestos-related disease in Libby, Montana—among people who worked in the vermiculite mines, their families, and other members of the community. Currently, the federal Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. Environmental Protection Agency (EPA) are conducting investigations to determine the extent of the health problems in this community.

The investigations in Libby have lead to further exploration of possible asbestos exposure in other locations around the country. Vermiculite ore has been shipped to and processed at many places, including the former Western Minerals Products site in Minneapolis.

Staff from the Minnesota Department of Health (MDH), Minnesota Pollution Control Agency (MPCA), and U.S. EPA have received reports of asbestos-related disease among former workers at the northeast Minneapolis facilities, as well as residents of the surrounding community.

We have also learned that the waste rock material was offered to area residents for free and was used as filler, in driveways, and for other purposes on their own property. Some people from the community played on piles of the waste rock many years ago when they were children.



Division of Environmental Health
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It is important to note that the health risks associated with exposure to asbestos in the vermiculite can vary, depending on the kind of exposure a person had.

Those at highest risk include:

- people who worked in the processing plant

Those at a lower risk include:

- people who lived with those workers,
- children who played on the waste rock piles

The risk may be lowest for:

- people who moved or used waste rock,
- people who simply live in the neighborhood but had no direct contact with the materials.

The Libby investigation should provide us with a clearer picture of the health risks.

Further investigation and clean-up planned

MDH, MPCA, and EPA are currently working on a multi-phase investigation. We want to more clearly define the extent of asbestos exposure from the Western Mineral Products site—both to workers and for people in the community.

An investigation of the waste material on the site, and in any off-site locations, will be conducted. Visible material in yards, driveways, and alleys will be removed. An assessment of asbestos in soil around the neighborhood will also be done.

Investigators plan to ask neighbors living near the site to complete a questionnaire. This will help to identify where the waste rock material may have been transported and used off the site.

Investigation and clean-up of visible areas of contamination will begin this fall and continue in the spring, when the ground is bare.

Preventing exposure

It is important that residents are informed of potential health risks associated with any waste rock that can still be found in the area. On the former Western Mineral Products/Grace site, the material has been covered with plastic and access to the site is restricted.

To prevent exposure to residents during removal activities, access to the area will be restricted. Clean-up workers will be protected from the dust with special protective clothing and respirators.

Residents who know they have this material on their property should cover the material and restrict access to it. If you have any of this material, you can call and report it to T. Stuart Hill of the EPA at (312) 886-0689. Homeowners should not attempt to remove the material themselves, since any disturbance of the asbestos-containing rock may release hazardous levels of asbestos into the air.

In place, Zonolite and other vermiculite insulation products do not present as much health risk to residents as the waste rock. There is usually no need to remove Zonolite or vermiculite insulation from homes. Homeowners who are concerned about the asbestos content of their insulation may want to have it tested by an accredited laboratory. To find one, you can contact the Minnesota Department of Health's Asbestos Unit at 651/215-0900.

For the safety of both residents and visitors in your home, asbestos-containing materials should be removed by a specially licensed contractor.

Residents concerned about health problems associated with asbestos exposure should consult their physician. A chest x-ray and lung function test can detect asbestos-related diseases. These diseases generally are not diagnosed until 20-30 years after exposure has occurred.

Vermiculite products still on the market

Although vermiculite no longer comes from the Libby mine, the EPA and the Consumer Product Safety Commission are investigating whether current vermiculite garden products contain harmful levels of asbestos. Testing so far indicates that most products contain little—if any—asbestos, and that this potential exposure poses a minimal health risk to consumers.

The EPA notes that these risks can be further reduced by:

- using vermiculite outdoors or in well-ventilated areas

- keeping vermiculite damp while using it to reduce the amount of dust created
- avoiding dust from vermiculite being brought into the home on clothing
- using pre-mixed potting soil, which usually contains more moisture and less vermiculite
- using other soil additives, such as peat, sawdust, perlite, or bark.

For more information

If you would like further information, address health concerns to Lisa Pogoff of the Minnesota Department of Health at 651/215-0916 or at lisa.pogoff@health.state.mn.us. Questions or concerns about the clean-up can be addressed to Jeff Connell of the MPCA at 651/296-7271 or at jeff.connell@state.mn.us. Additional sources of information about vermiculite and asbestos include:

U.S. EPA website: <http://www.epa.gov/>

EPA asbestos page: <http://www.epa.gov/asbestos>

EPA Superfund hotline:

<http://www.epa.gov/epaoswer/hotline>

Consumer Product Safety Commission:

<http://www.cpsc.gov/>

<http://www.cpsc.gov/cpscpub/pubs/5080.html>

EPA Superfund hotline: 1/800-424-9346,

TDD: 1/800-553-7672

Agency for Toxic Substances and Disease

Registry info line: 1/888-42-ATSDR

Office Memorandum

DATE: June 12, 2001

TO: Jim Kelly
Minnesota Department of Health, Environmental Health

FROM: Gregory C. Pratt, Ph.D. *G.C. Pratt*
Research Scientist
Environmental Outcomes Division

PHONE: 612.296.7664

SUBJECT: Modeled Concentrations and Deposition of Tremolite Near the Western Mineral Products/W.R. Grace Facility

Introduction

This memo documents an air dispersion modeling study done to estimate airborne concentrations and deposition of tremolite fibers around the Western Mineral Products/W.R. Grace, Inc. vermiculite processing facility in Northeast Minneapolis. The study consisted of two parts: 1) estimation of emissions; and 2) use of an air dispersion model to estimate airborne concentrations and fiber deposition onto surfaces in the vicinity of the plant. Two time periods were considered, the period 1936 to 1972 (from initiation of operations until the baghouse filtration system was installed) and the period 1972 to 1989 (from baghouse installation until the facility ceased operations). The following sections discuss emissions estimation, modeling procedures, and modeling results.

Estimation of Emissions

Two fifty foot stacks served the expanding furnaces and a third stack served the monokote mixer. In addition to these three point sources, four sources of fugitive emissions were identified: 1) rail unloading of raw material; 2) rail loading of finished product; 3) truck loading of finished product (including truck traffic on unpaved surfaces containing tremolite fibers); and 4) handling and wind erosion of the waste pile. Figures 1 and 2 are photographs of the facility from opposite angles taken in February, 2001. Figure 3 is a schematic diagram showing the locations of the buildings and sources as represented in the model.

Attachment 1 is a spreadsheet showing the stack parameters and emissions calculations for the stacks for each of the two time periods. Two options were possible for estimating stack emissions. The first option was to use the 1977 and 1985 reported stack emissions. The second option was to use the estimated baghouse loading and the estimated baghouse efficiency. The 1977 emissions inventory report shows emissions of 0.12 tons per year of (tpy) of total suspended particles (TSP) for stacks one and two and 0.10 tpy of TSP for stack three. These values were said to be based on stack test data although the reports do not specify a test date nor whether this facility or some similar facility was tested. The 1985 emissions inventory report shows emissions

of 0.06 tpy of particles less than ten micrometers in diameter (PM_{10}) for stacks one and two and 0.02 tpy PM_{10} for stack three. These values were said to be based on stack tests of similar equipment. No documentation of the stack tests was available.

Several documents contained information about the configuration, operation, and efficiency of the baghouse, including the 1977 and 1985 emissions inventory reports, the 1972 plans and specifications for the baghouse submitted by the company to the Minnesota Pollution Control Agency (MPCA), the 1975 MPCA Operating Permit, a report to the U.S. Environmental Protection Agency from the company (date obscured) on emissions of hazardous air pollutants, and a 1986 internal company document entitled *Process Description and Waste Profile*. The permit-allowable particle emissions were considerably larger than the amounts in the emission inventory reports. Based on the baghouse configuration, operation, and efficiency as outlined in the aforementioned documents, I judged the amount of particle emissions to be larger than the amounts reported in the emissions inventory reports for 1977 and 1985. For that reason, the second option for estimating stack emissions was used for stacks one and two, i.e., estimated baghouse loading and the estimated baghouse efficiency. The only emissions information available for stack three were the emissions inventory reports, so those data were used for this stack.

The baghouse loading was given as between 15 and 20 pounds per hour (lb/hr), and the tremolite concentration of the baghouse inputs was given as 1-3%. These values were used to place upper and lower bounds on the stack emissions (see Attachment 1). The upper and lower bound values differed by almost one order of magnitude. The average of the upper and lower bound values was used as the modeled emission rate for each of the two timeframes. The documents mentioned in the preceding paragraph give conflicting information on the hours per day of operation of the facility. Some suggest that the facility operated two shifts per day, while the emissions inventory reports mention 24-hour per day operation. For this simulation the furnaces were assumed to be operating at full production for 16 hours per day (6:00 am to 10:00 pm). This assumption is warranted since, even if the facility operated longer hours on some days, it is unlikely that full production was maintained for more than the equivalent of 16 hours per day over an extended period of time. The model-predicted concentrations are not dramatically changed using this assumption.

Attachment 2 is a spreadsheet showing the methods and equations for calculating fugitive emissions. The rail unloading emissions were taken from the U.S. EPA emission factor document for vermiculite processing. No emission factors were available for rail or truck loading, so the emissions from these sources were taken as one-half of the rail unloading emissions. This estimate was a judgment based on the fact that the loaded product was packaged, thus preventing some emissions as compared to the unloading process. The wind erosion and materials handling emissions from the waste pile were taken from U.S. EPA emissions factors documents for industrial wind erosion and aggregate handling and storage piles, respectively. Emissions from traffic in the unpaved truck loading area were developed from U.S. EPA emissions factors for traffic on unpaved roads. All of the fugitive emissions sources were characterized as area sources. The lateral dimensions of each source can be seen in Figure 3. The waste pile was given an initial

vertical dimension of two meters, while the other fugitive sources were given an initial vertical dimension of one meter.

The fugitive emissions estimates were based on total annual production. Apportioning the emissions to specific times of the day was not feasible since loading and unloading could have occurred at any time. Similarly, wind erosion from the waste pile was not limited to specific hours of the day. An often-used simplification was assumed in which the fugitive emissions were apportioned evenly throughout the hours of the year. This assumption does not significantly affect the model-predicted long-term concentrations; however, it may lead to some underestimation of the maximum short-term (e.g., 1-hour average) concentrations.

Modeling Procedures

The ISC-Prime model was chosen for this analysis. The ISC model is the currently recommended model for industrial sources in the U.S. EPA Guideline on Air Quality Modeling (40 CFR 51, Appendix W). ISC-Prime represents a new version of the ISC model that has been proposed for adoption as a Guideline model. This new version contains an improved algorithm for calculating building-wake effects, the Prime algorithm. Since the Western Mineral Products/W.R. Grace, Inc. facility stacks are subject to building wake effects, the use of the best available model for considering such effects was considered important.

The model was run using the regulatory default model options. Five years of meteorological data (1986-1990) from the Minneapolis-St. Paul International Airport (surface data) and from St. Cloud (upper air data) were used in the analysis. Both air concentrations and total (wet plus dry) deposition were calculated. Plume depletion was not used. A polar-coordinate grid system of receptors was used with receptors located at distances of 50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, and 1500 meters at every ten degrees of the compass. In addition, a group of 656 discrete Cartesian receptors was specified, corresponding to all street addresses located within 500 meters of the facility. These discrete receptors were included so that concentrations could be predicted at each of the individual homes and businesses within the 500-meter radius. Terrain elevations were included. Predictions were made of the maximum one-hour, 24-hour, and long-term average concentrations and the long-term deposition fluxes.

Modeling Results

Figures 4-11 are maps of the area around the Western Mineral Products/W.R. Grace, Inc. facility showing isopleths of concentrations of airborne tremolite fibers in units of fibers per cubic centimeter of air (Figures 4-6 and 8-10) or deposition of tremolite fibers in units of fibers deposited per square meter of land area (Figures 7 and 11). Figures 4-7 pertain to the case after the baghouse filtration system was installed (i.e., after 1972), while Figures 8-11 pertain to the

Three things are immediately apparent from the maps. First, the pattern of concentrations and deposition around the facility is nearly uniform, i.e., the concentration isopleths form approximately circular patterns around the facility rather than being skewed in one direction or another. This pattern is not unusual for a facility of this type. Second, the concentration and deposition gradients are quite steep. Concentrations and deposition are highest in the immediate vicinity of the facility, but drop off rapidly with distance, in many cases decreasing by an order of magnitude within a few hundred meters. Third, the pre-baghouse and post-baghouse cases differ by approximately one order of magnitude.

Attachment 3 gives a listing of the concentrations and deposition predicted at all the addresses within 500 meters of the facility. Concentrations at other addresses can be determined by manually viewing the isopleth maps, but in addition, I will supply electronic versions of the plot files so that concentrations and deposition can be interpolated for any address of interest.

Table 1 lists the minimum and maximum model-predicted airborne concentrations of tremolite fibers for each of the cases (Pre-baghouse and Post-baghouse) and averaging times (one-hour, 24-hour, and long-term), as well as the long-term deposition of tremolite fibers. The maximum concentrations and deposition invariably occurred within a few meters of the facility, and the minimum concentrations occurred at the most distant receptors (i.e., 1500 meters from the facility).

Attachment 4 is a listing of the model output file for the Pre-baghouse (1936-1972) case, and attachment 5 is a listing of the model output file for the post-baghouse (1972-1989) case. These two attachments are over 100 pages in hard copy and will be supplied in electronic format only.

Sources of Error

As with all such undertakings, there are several sources of error that affect the estimated concentrations and deposition. The predicted concentrations and deposition should be thought of as the best central estimate with error bounds on either side. Exact numerical propagation of each of the sources of error through the entire modeling process is beyond the scope of this analysis; however, I will attempt to give some insight into the types and magnitudes of the possible sources of error.

The model itself is a mathematical representation of atmosphere and does not perfectly simulate all the processes that affect pollutant dispersion. It is often stated (see U.S. EPA Modeling Guideline, 40 CFR 51, Appendix W) that the current generation of regulatory air dispersion models are capable of accuracy to within a factor of two, given accurate information on the source release characteristics and representative meteorological data. Model accuracy is also known to be better for long averaging times (e.g., annual average) than for short averaging times (e.g., one-hour average).

In the present study, the meteorological data can be considered to be reasonably reliable and representative. It was taken from a contiguous five-year period at the Minneapolis-St. Paul airport (surface data) and from St. Cloud (upper air data). The surface data site is within 15 kilometers of the facility, and there are no significant terrain features between the locations that would dramatically affect airflow patterns. The upper air data site, while approximately 100 km distant, was the nearest source of upper-air soundings available. Use of this type of off-site, National Weather Service meteorological data is routine for this type of modeling study, and while there are undoubtedly some errors introduced by using off-site meteorological data, these errors are likely to be minor when compared to errors in source characterization.

The Western Mineral Products/W.R. Grace facility in northeast Minneapolis has been out of operation for about 12 years. The buildings are still standing, but the stacks have been removed. Information about the operation of the stacks was taken from older documents whose reliability is at least somewhat uncertain. The stack physical dimensions are likely to be accurate, but the temperature, airflow, and tremolite fiber concentrations in the stack gases were likely to have varied over time for multiple reasons. In addition, the loading to the baghouse was only given to within specified limits (15-20 lb/h). The data currently available on the stack emission parameters represent estimates taken once (or a few times), usually for the purpose of fulfilling a regulatory requirement (e.g., permit application or emissions inventory report). Some of the estimates were likely based on measurements made at the facility, some estimates may have been based on similar equipment operated elsewhere, and other estimates may have been based upon the equipment vendor's specifications.

Another source of error is the tremolite concentration in the raw materials supplied to the facility. The concentration likely varied from shipment to shipment, but such data were not collected. There is information about the range in the amounts of tremolite fibers typically seen in the various materials (Stoner Rock ~ 2% to 10%, Baghouse Fines ~ 1% to 3%, Vermiculite Screenings - <0.5%), but not for the actual individual shipments made to the Minneapolis plant. The bottom line is that the total range of uncertainty in the stack emissions may be on the order of a factor of ten.

The largest source of error in the source characterization is undoubtedly that for the fugitive sources. Fugitive sources represented one percent of the total emissions in the Pre-baghouse case and nine percent of the total emissions in the post-baghouse case (Table 2). These emissions are quantified using information about the amounts of material handled (both raw materials and finished products), the amounts of tremolite fibers in the materials, the number of vehicles required to transport the products, and other factors. The emission factors were based on values developed for general industrial classifications and for generic process like wind-entrainment of dust and vehicle traffic on unpaved surfaces. The uncertainties in the fugitive source parameterizations cannot be accurately quantified.

Attachment 6 gives the comments made by the Minnesota Department of Health and my responses.

Table 1. Minimum and maximum model-predicted airborne concentrations of tremolite fibers in the modeling domain for each of the cases (Pre-baghouse and Post-baghouse) and averaging times (one-hour, 24-hour, and long-term), as well as the long-term deposition of tremolite fibers

| Case/Averaging Time | Minimum concentration (fibers/cc) or deposition (fibers/m ²) | Maximum concentration (fibers/cc) or deposition (fibers/m ²) |
|----------------------------|--|--|
| Post-Baghouse | | |
| One-hour average | 0.00049 | 0.0426 |
| 24-hour average | 0.00004 | 0.0101 |
| 1972-89 average | 0.000001 | 0.0015 |
| Deposition (1972-89) | 46 | 31,612 |
| | | |
| Pre-Baghouse | | |
| One-hour average | 0.00677 | 0.2524 |
| 24-hour average | 0.00049 | 0.1089 |
| 1936-72 average | 0.00002 | 0.0148 |
| Deposition (1936-72) | 1049 | 838,211 |
| Total Deposition (1936-89) | 1096 | 869,824 |

Table 2. Apportionment of emissions between stack and fugitive sources. Values are in tons per year (tpy) of tremolite fiber emissions.

| Case | Stack emissions (tpy) | Fugitive emissions (tpy) | Total emissions (tpy) | Percent Fugitive |
|---------------|--------------------------|-----------------------------|--------------------------|---------------------|
| Pre-baghouse | 0.790 | 0.0116 | 0.802 | 1% |
| Post-baghouse | 0.054 | 0.0052 | 0.059 | 9% |

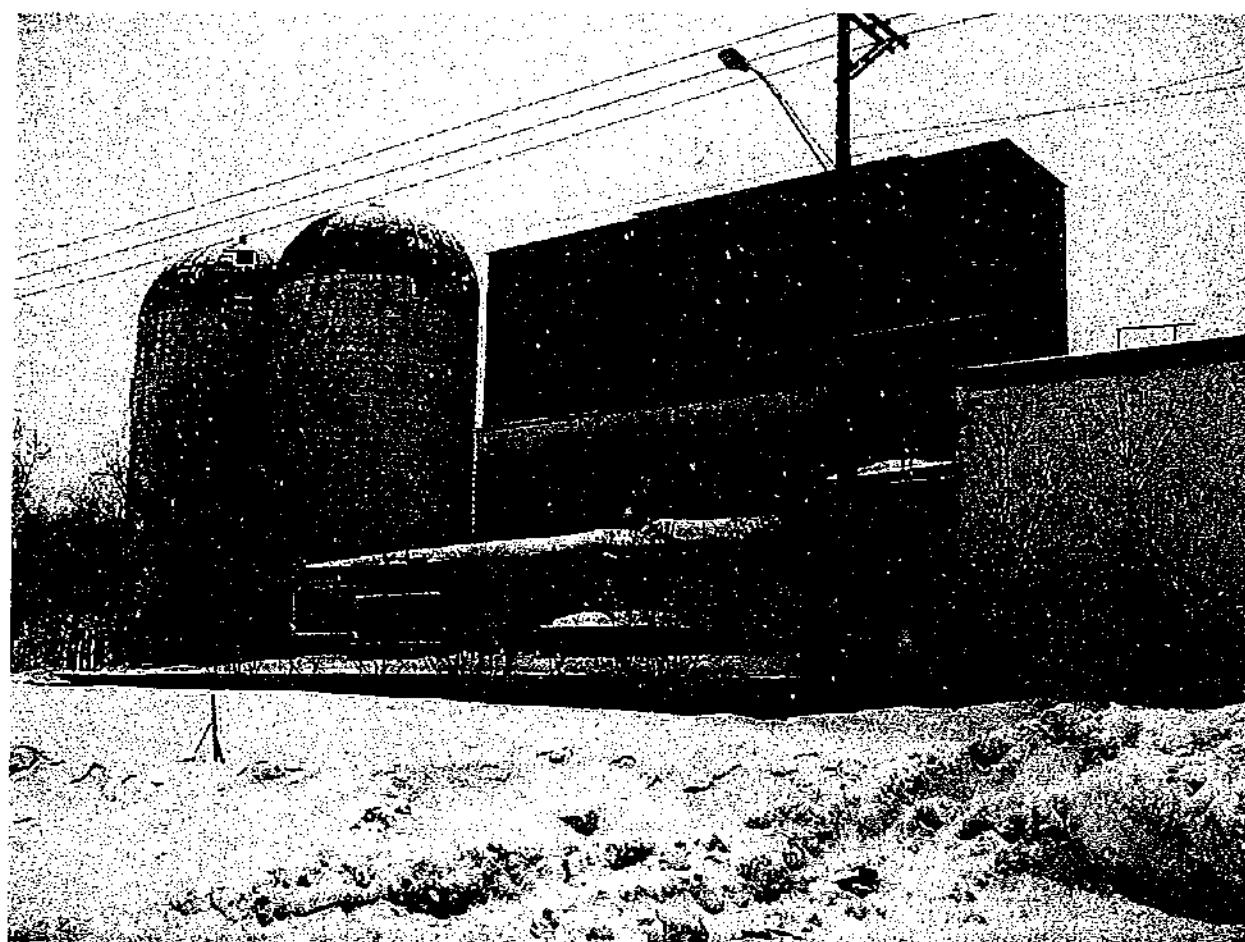


Figure 1. Photograph of the Western Mineral Products/W.R. Grace facility taken in February, 2001. This photo shows the north side of the four-story, sheet-metal building that housed the expanding furnace. To the left are raw material storage silos, and to the right is the cement-block building for product handling and shipping.



Figure 2. Photograph of the Western Mineral Products/W.R. Grace facility taken in February, 2001. This photo was taken from the southwest side of the facility. The four-story, sheet-metal building that housed the expanding furnace can be seen in the background. To the right is the brick building which housed operations and some shipping, and to the left is the cement-block building for product handling and shipping. The waste pile was located at the far left end of the cement-block building.

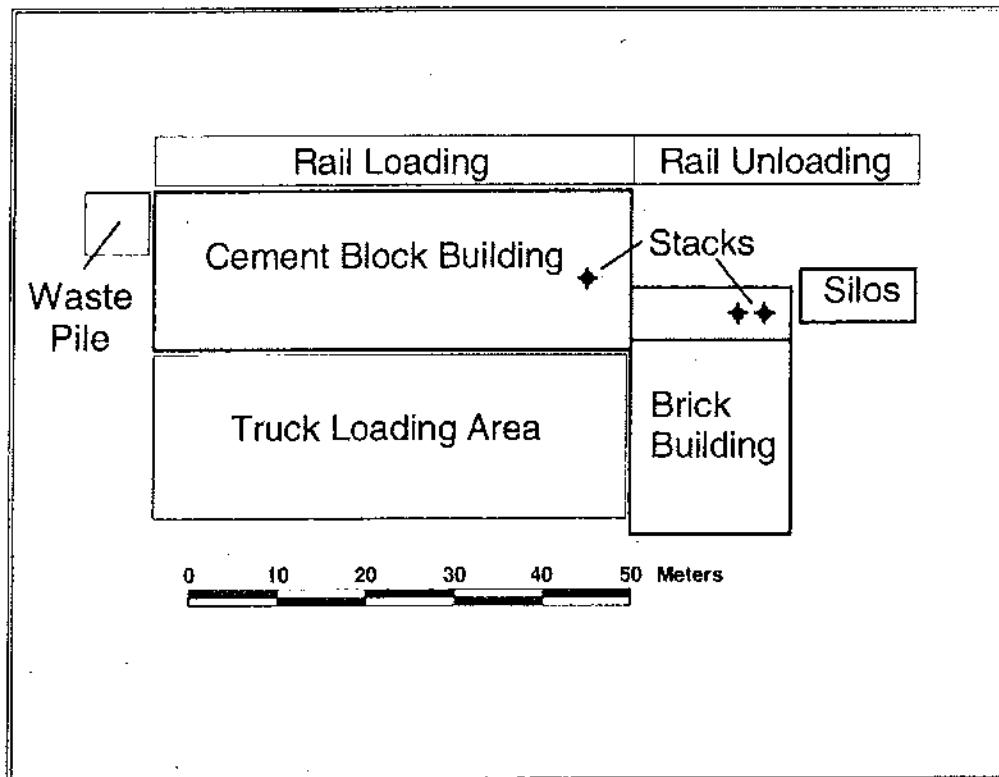


Figure 3. Schematic diagram of the Western Mineral Products/W.R. Grace, Inc. facility showing the locations of the buildings and the sources as represented in the air dispersion model. The three cross marks are the three stacks, two of which were located on the sheet-metal building and the third (monokote mixer stack) was located on the cement block building. The sheet-metal building, the only building not labeled in the diagram, is located directly north of the brick building.

Modeled Concentrations and Deposition of Tremolite Near the
Western Mineral Products/W.R. Grace Facility

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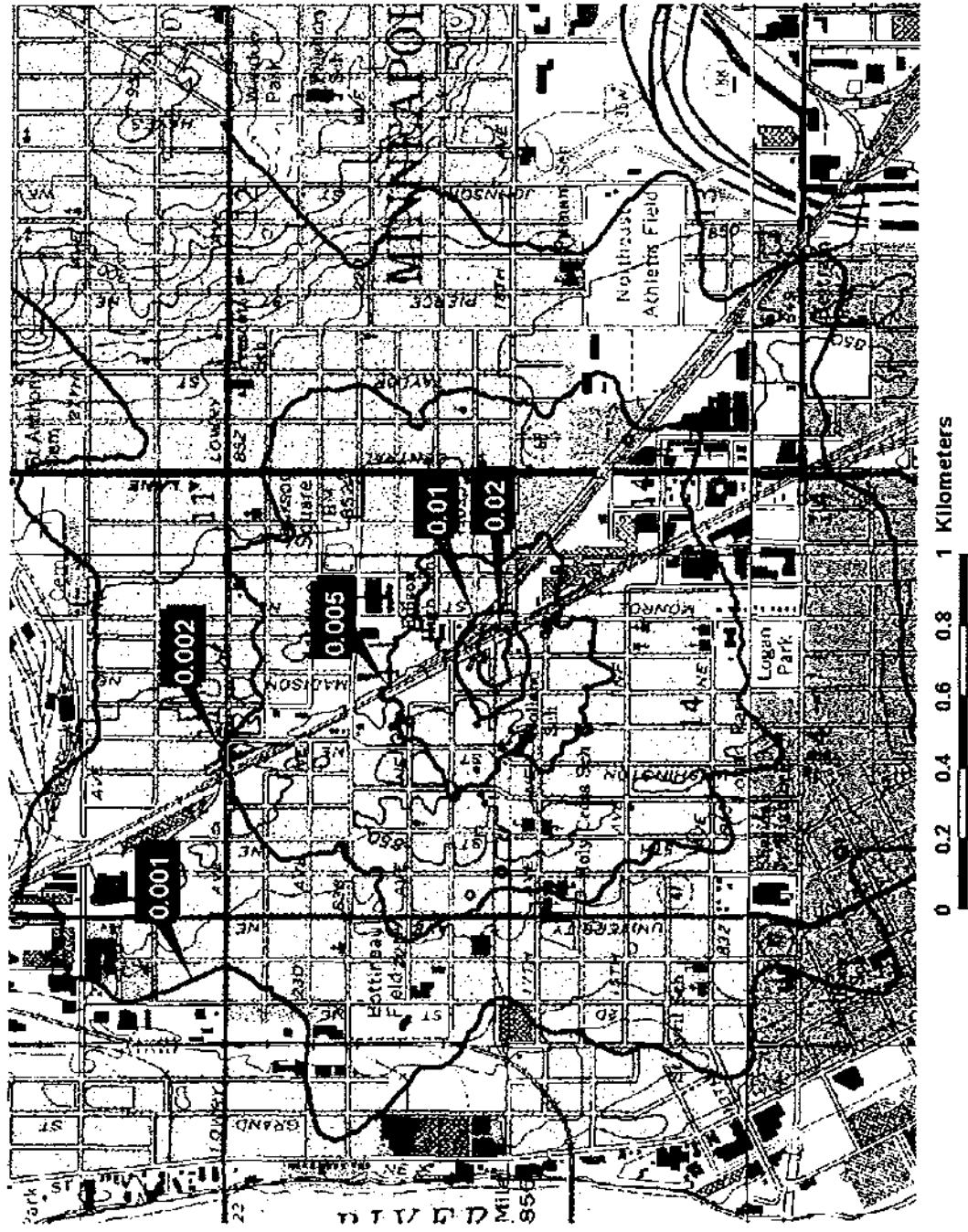


Figure 4. Map showing isopleths of the model-predicted maximum one-hour average concentrations of airborne tremolite fibers for the post-baghouse (1972-1989) case. Concentrations are in units of fibers per cubic centimeter of air (fibers/cc).

Modeled Concentrations and Deposition of Tremolite Near the
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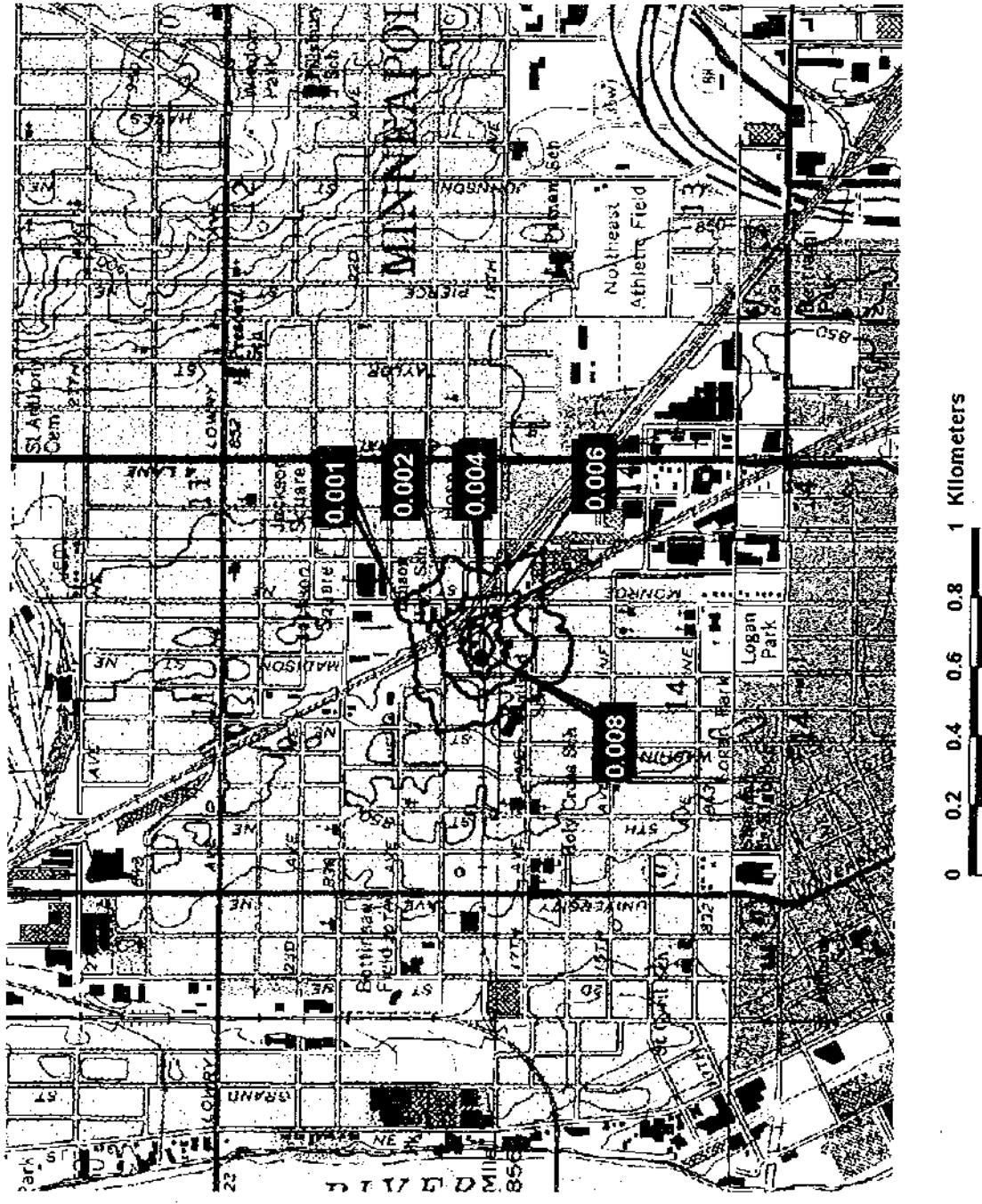


Figure 5. Map showing isopleths of the model-predicted maximum 24-hour average concentrations of airborne tremolite fibers for the post-baghouse (1972-1989) case. Concentrations are in units of fibers per cubic centimeter of air (fibers/cc).

Modeled Concentrations and Deposition of Tremolite Near the
Western Mineral Products/W.R. Grace Facility

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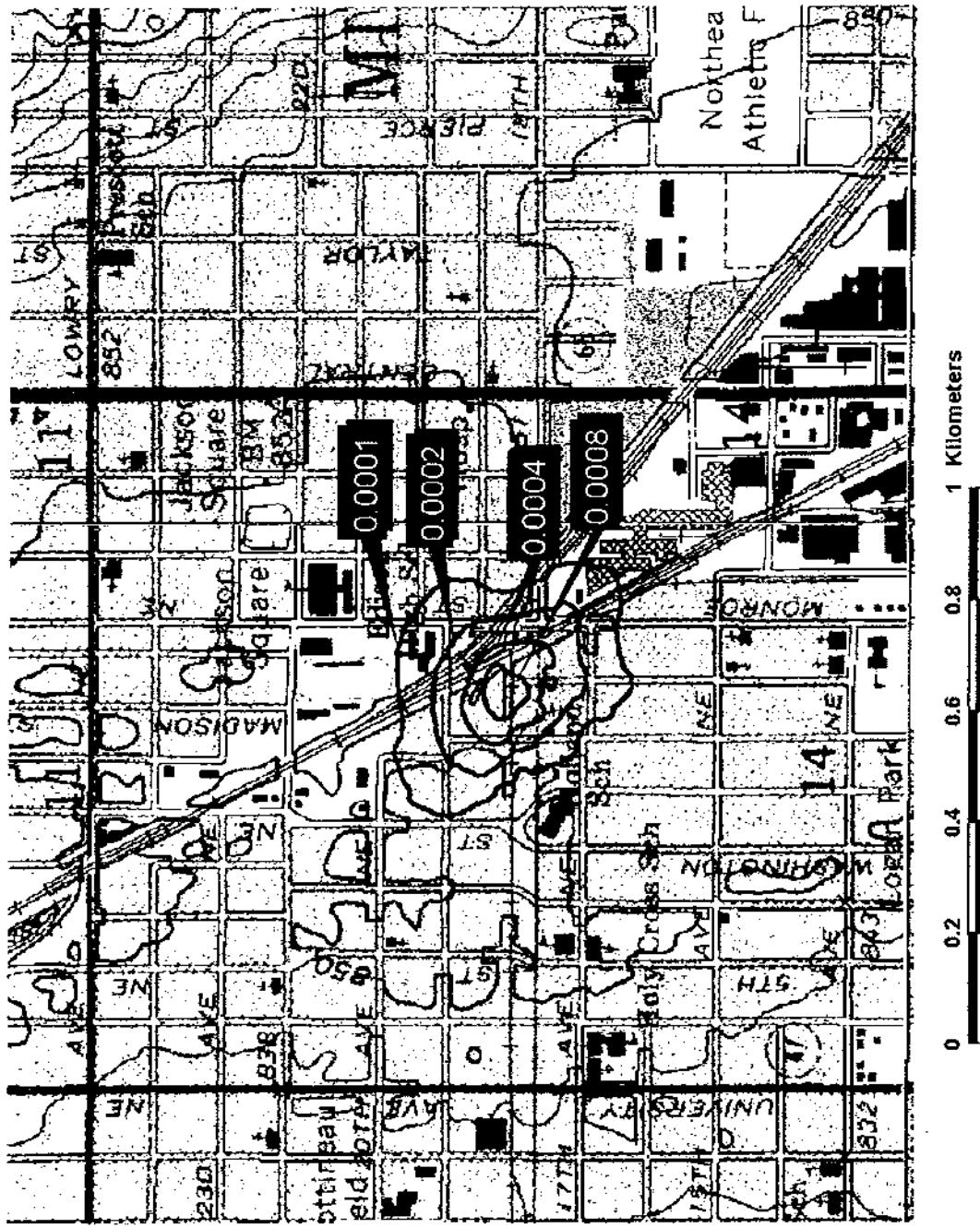


Figure 6. Map showing isopleths of the model-predicted long-term average concentrations of airborne tremolite fibers for the post-baghouse (1972-1989) case. Concentrations are in units of fibers per cubic centimeter of air (fibers/cc).

Modeled Concentrations and Deposition of Tremolite Near the
Western Mineral Products/W.R. Grace Facility

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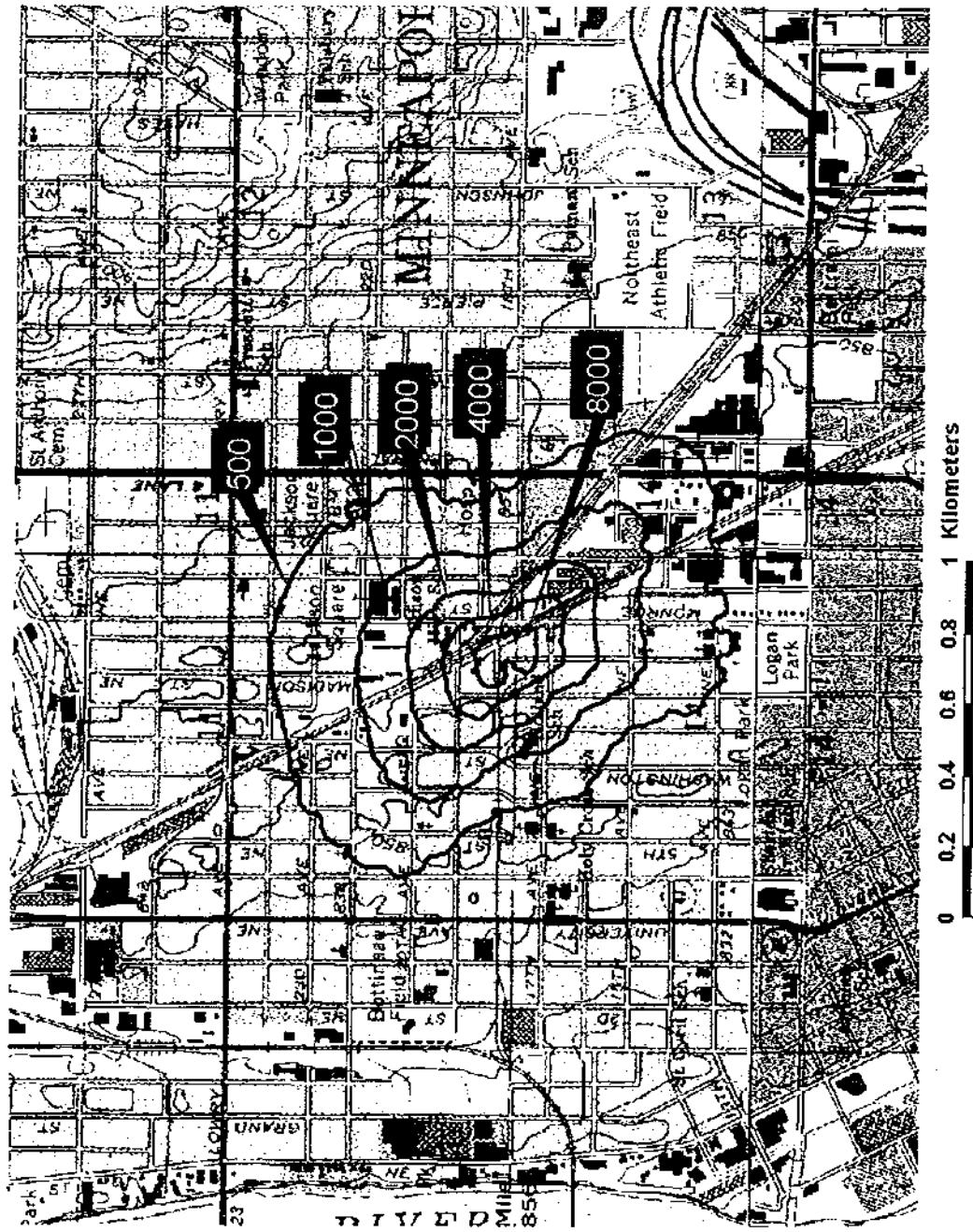


Figure 7. Map showing isopleths of the model-predicted deposition of tremolite fibers for the post-baghouse (1972-1989) case. Concentrations are in units of fibers deposited per square meter of land area (fibers/m²).

Modeled Concentrations and Deposition of Tremolite Near the
Western Mineral Products/W.R. Grace Facility

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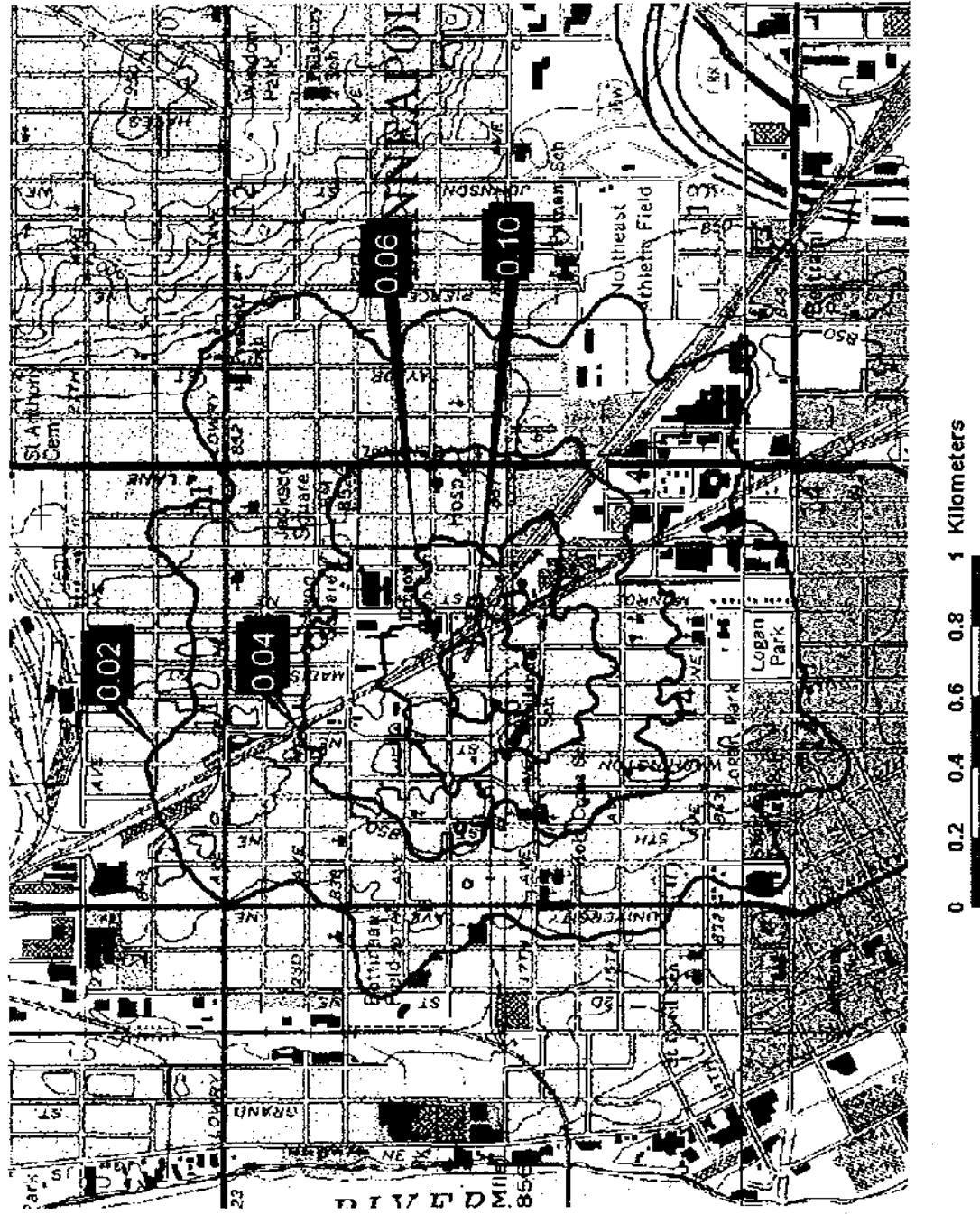


Figure 8. Map showing isopleths of the model-predicted maximum one-hour average concentrations of airborne tremolite fibers for the pre-baghouse (1936-1972) case. Concentrations are in units of fibers per cubic centimeter of air (fibers/cc).

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Western Mineral Products/W.R. Grace Facility

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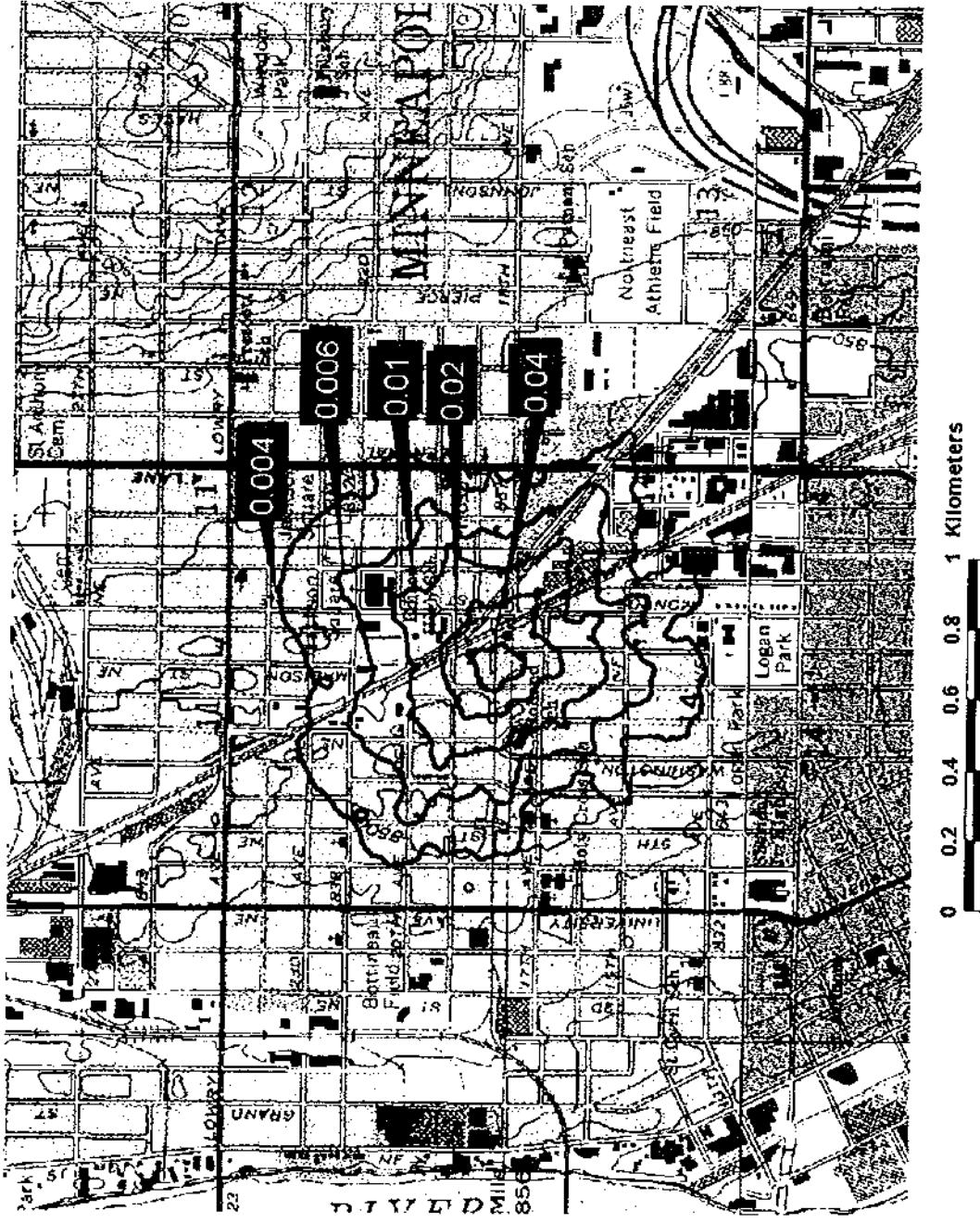


Figure 9. Map showing isopleths of the model-predicted maximum 24-hour average concentrations of airborne tremolite fibers for the pre-baghouse (1936-1972) case. Concentrations are in units of fibers per cubic centimeter of air (fibers/cc).

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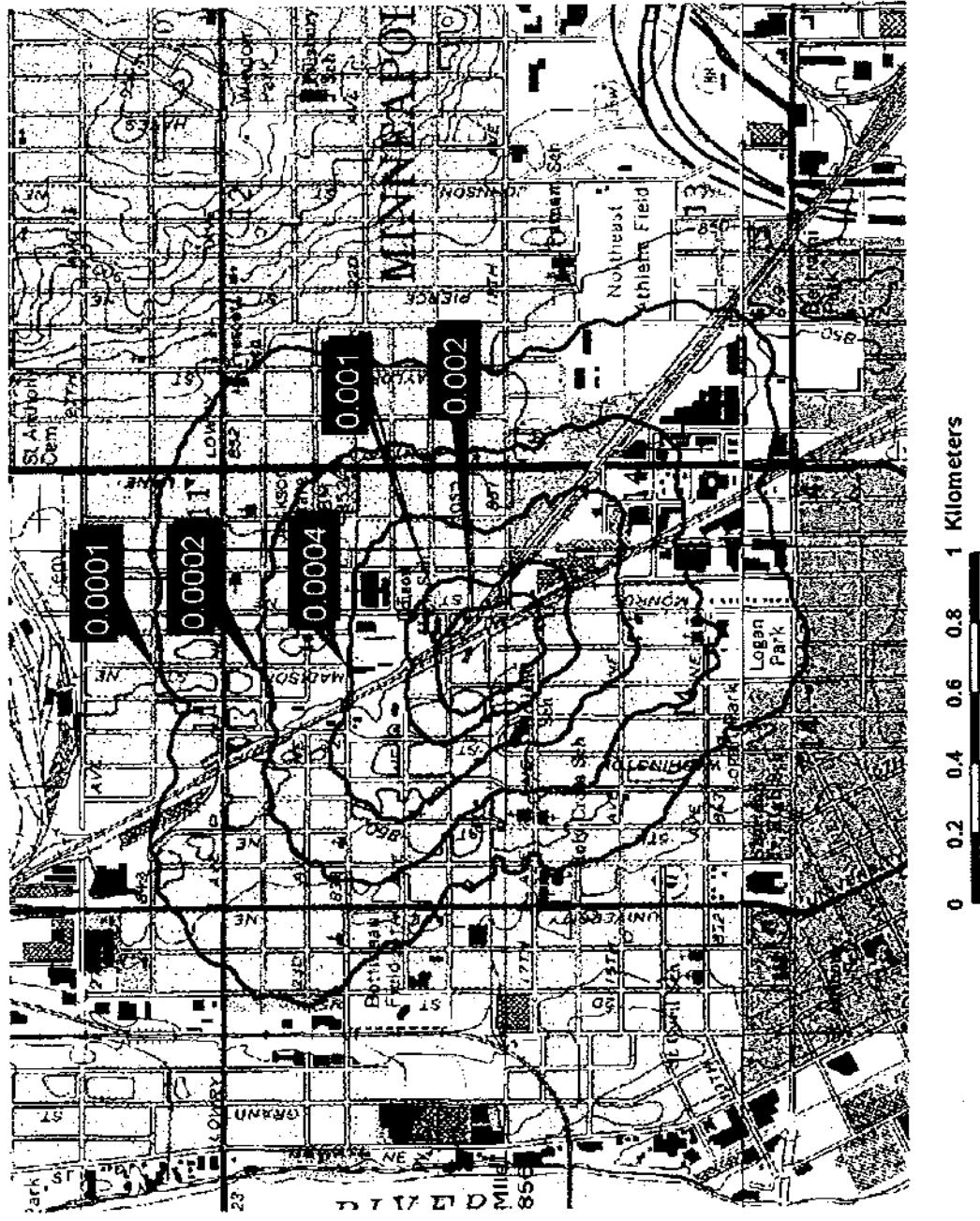


Figure 10. Map showing isopleths of the model-predicted long-term average concentrations of airborne tremolite fibers for the pre-baghouse (1936-1972) case. Concentrations are in units of fibers per cubic centimeter of air (fibers/cc).

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Western Mineral Products/W.R. Grace Facility

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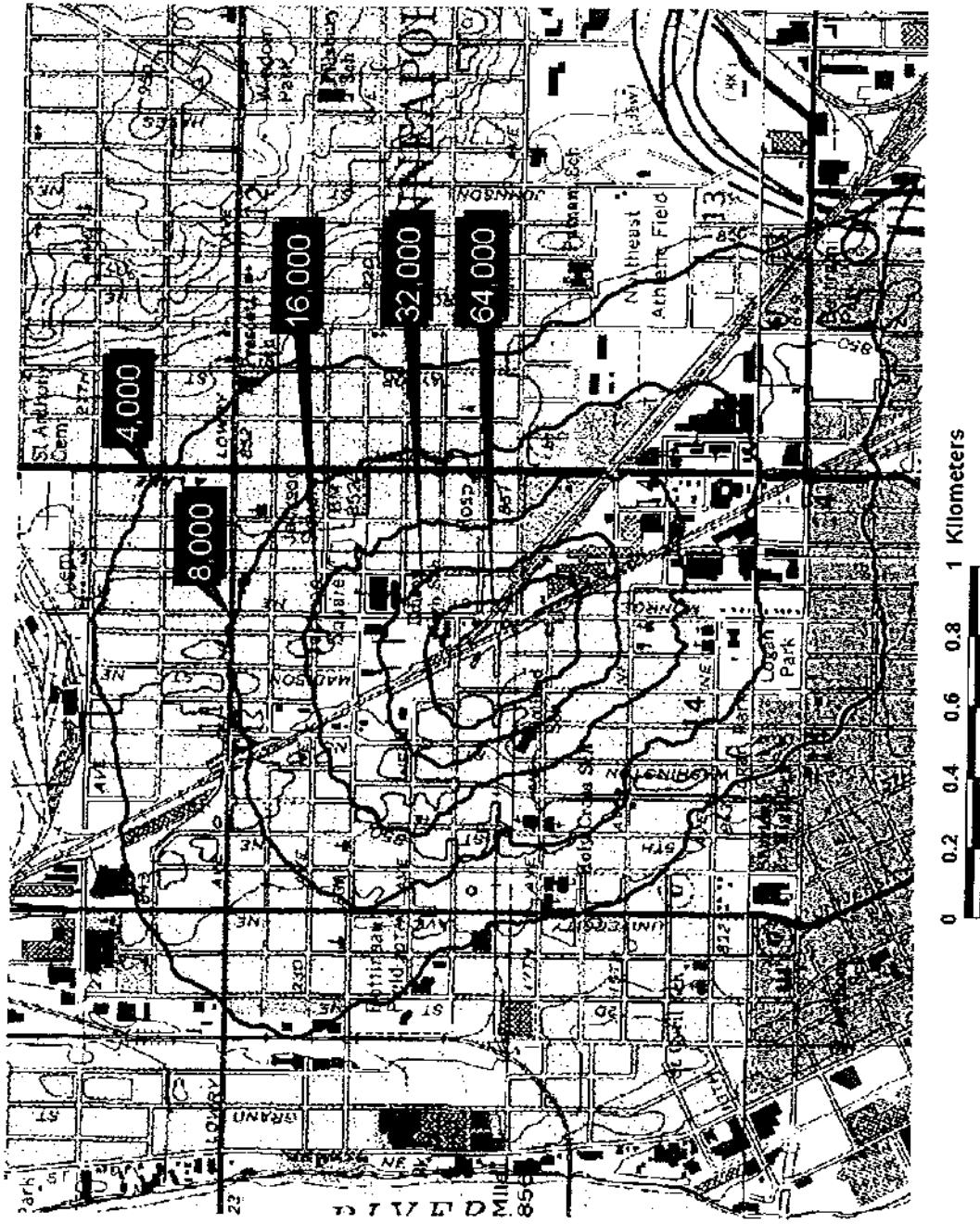


Figure 11. Map showing isopleths of the model-predicted deposition of tremolite fibers for the pre-baghouse (1936-1972) case. Concentrations are in units of fibers deposited per square meter of land area (fibers/m²).

Modeled Concentrations and Deposition of Tremolite Near the
Western Mineral Products/W.R. Grace Facility

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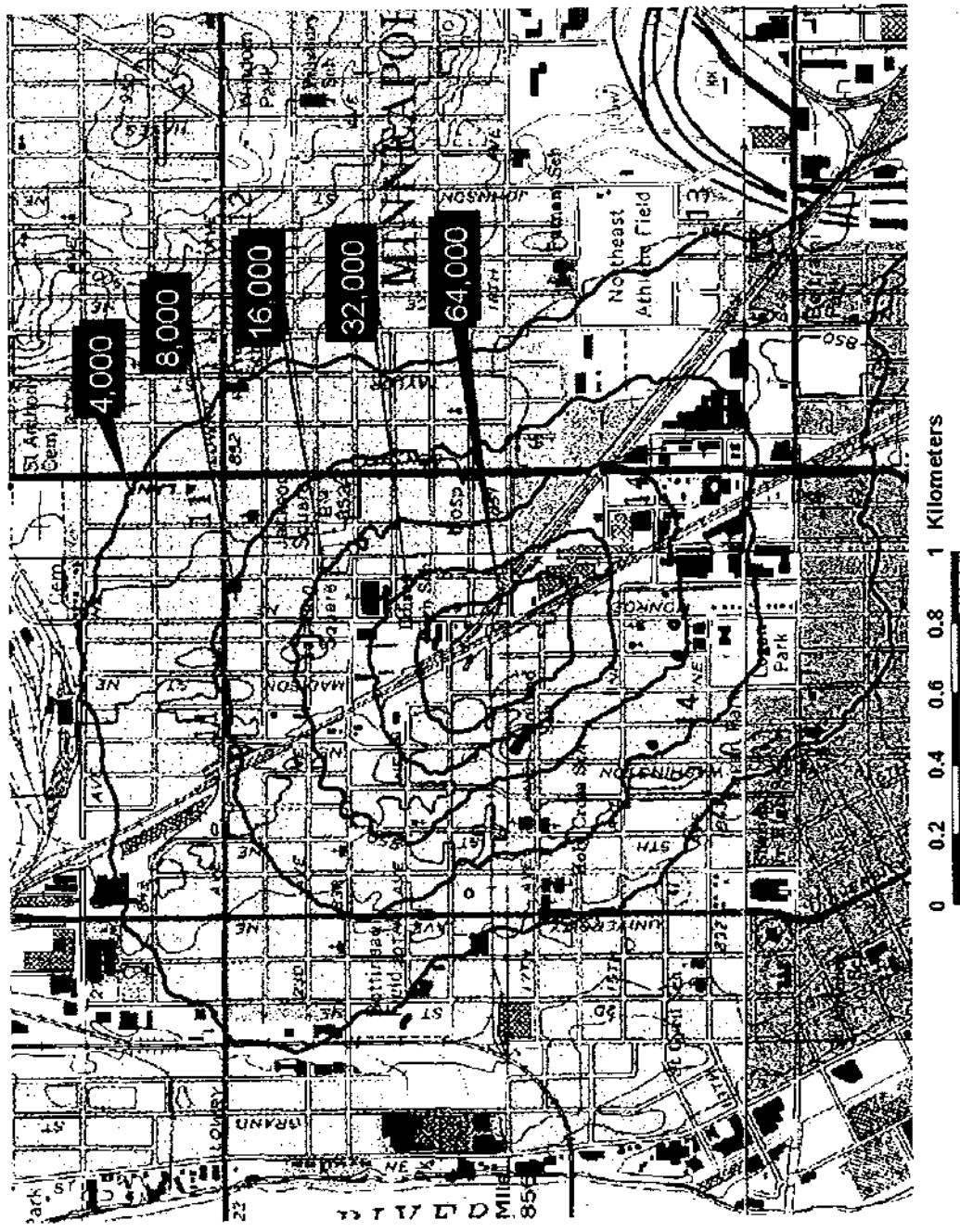


Figure 12. Map showing isopleths of the total model-predicted deposition of tremolite fibers for the period of operation of the facility (1936-1989). Concentrations are in units of fibers deposited per square meter of land area (fibers/m^2).

Attachment 1 - Emissions.xls - Stacks

| Source | Stack Height (m) | Stack Diameter (m) | Exit Velocity (m/s) | Exit Temperature (K) | lower bound | | upper bound | |
|--|------------------|--------------------|---------------------|----------------------|--------------------------|---------------------|-----------------------------------|------------------------------|
| | | | | | Stack Exit Reported 1977 | Stack Reported 1985 | Tremo-lite % Emissions (tpy PM10) | Tremo-lite % Emissions (g/s) |
| Post 1972 Baghouse Installation | | | | | | | | |
| Stack 1 | 15.24 | 0.6096 | 8.128 | 383 | 0.12 | 0.06 | 1% 6.00E-04 | 1.73E-05 3% 3.60E-03 |
| Stack 2 | 15.24 | 0.6096 | 8.128 | 383 | 0.12 | 0.06 | 1% 6.00E-04 | 1.73E-05 3% 3.60E-03 |
| Stack 3 | 15.24 | 0.3810 | 12.39 | 273 | 0.10 | 0.02 | 0.50% 1.00E-04 | 2.88E-06 3% 3.00E-03 |
| Pre 1972 Baghouse Installation | | | | | | | | |
| Stack 1 | 15.24 | 0.6096 | 8.128 | 383 | 1% | 3% | | |
| Stack 2 | 15.24 | 0.6096 | 8.128 | 383 | 1% | 3% | | |
| Stack 3 | 15.24 | 0.3810 | 12.39 | 273 | 0.10 | 0.02 | 0.50% 1.00E-04 | 2.88E-06 3% 3.00E-03 |
| Pre 1972 Baghouse Installation | | | | | | | | |
| | | | | | 1% 0.50% | 3% 3.00E-03 | | |
| | | | | | 1.00E-04 | 2.88E-06 | | |
| | | | | | | | 8.63E-05 | |

Based on 1977 and 1985 Reported Stack Emissions
See Next Page For Alternate (Preferred) Calculation

Attachment 1 - Emissions.xls - Stacks

| lower bound | | | upper bound | | | Average |
|--|----------------------------------|--|---|--------------------------------------|--------------------------------------|---|
| PM10 | | | PM10 | | | |
| Estimated Emissions | Estimated Baghouse from Loading | Calculated Efficiency and Efficiency (%) | Calculated Tremolite Emissions (tpy PM10) | Calculated Tremolite Emissions (tpy) | Calculated Tremolite Emissions (g/s) | |
| Estimated Baghouse Loading (lb/hr) | Estimated Baghouse Loading (tpy) | Calculated Efficiency and Efficiency (%) | Calculated Tremolite Emissions (tpy PM10) | Calculated Tremolite Emissions (tpy) | Calculated Tremolite Emissions (g/s) | |
| Stack 1 15 | 0.329 | 99.5% | 0.0033 | 9.45E-05 | 20 | 99% 0.876 0.0263 7.56E-04 4.25E-04 |
| Stack 2 15 | 0.329 | 99.5% | 0.0033 | 9.45E-05 | 20 | 99% 0.876 0.0263 7.56E-04 4.25E-04 |
| Stack 3 99.5% | 2.88E-06 | | | | 99% | 4.46E-05 2.37E-05 |
| Post 1972 Baghouse Installation | | | | | | |
| Pre 1972 Baghouse Installation | | | | | | |
| Stack 1 15 | 9.855 | 85% | 0.0986 | 2.83E-03 | 20 | 85% 13.140 0.3942 1.13E-02 7.09E-03 |
| Stack 2 15 | 9.855 | 85% | 0.0986 | 2.83E-03 | 20 | 85% 13.140 0.3942 1.13E-02 7.09E-03 |
| Stack 3 85% | 2.88E-06 | | | | | 4.46E-05 2.37E-05 |

Based on Estimated Baghouse Loading and Baghouse Efficiency

Attachment 2 - Emissions.xls - Fugitives

| Source | emission factor | units | Data Source | Mg loaded (e) or unloaded | VMT (c) | PM10 Emissions (kg/hr) (g/s) | PM10 Area (m ²) | PM10 Emissions (g/m ² /s) | Average Case | | Post 1972 / Lower Bound | | Pre 1972 / Upper Bound | | |
|--------------------------------|-----------------|---------------------|-------------|---------------------------------|------------|---------------------------------------|-----------------------------------|--|-------------------------------|---|-------------------------------|---|-------------------------------|---|----------|
| | | | | | | | | | % Tremolite Tremo- lite | Tremolite Emissions (g/m ² /s) | % Tremolite Tremo- lite | Tremolite Emissions (g/m ² /s) | % Tremolite Tremo- lite | Tremolite Emissions (g/m ² /s) | |
| Rail Unloading (d) | 0.017 | kg/Mg | AP-42 (f) | 1.02 | 103.5320 | 0.003683 | 1723 | 2.132E-05 | 14.09 | 1.92E-07 | 13.92 | 7.69E-07 | 14.20 | 1.95E-07 | |
| Rail Loading (d) | 0.0065 | kg/Mg | AP-42 (f) | 0.2465 | 0.0016023 | 0.0004451 | 1080 | 4.121E-07 | 1.75 | 2.71E-08 | 0.50 | 7.69E-09 | 3.00 | 1.24E-08 | |
| Waste Pile - wind erosion | 6.48E-06 | g/m ² /s | AP-42 (f) | | | | 64 | 6.48E-06 | 6.00 | 3.89E-07 | 2.00 | 1.30E-07 | 10.00 | 6.48E-07 | |
| Waste Pile - handling | 0.083402 | kg/Mg | AP-42 (g) | 0.017 | | 0.00142 | 0.0003938 | 64 | 8.154E-06 | 8.00 | 3.69E-07 | 2.00 | 1.23E-07 | 10.00 | 6.15E-07 |
| Sum: Waste Pile | | | | | | | | | | | | | | | |
| Truck Loading | 0.0065 | kg/Mg | (d) | 0.2465 | 0.0016023 | 0.0004451 | 1080 | 4.121E-07 | 1.75 | 7.21E-09 | 0.50 | 2.06E-09 | 3.00 | 1.24E-08 | |
| Unpaved Loading Area (h) | 0.359183 | lb/VMT | AP-42 (a) | | 66.5 | 0.0029567 | 0.0008213 | 1080 | 7.605E-07 | 4.50 | 3.42E-08 | 0.05 | 3.80E-10 | 8.00 | 6.08E-08 |
| Sum: Truck Loading Area | | | | | | | | | | | | | | | |

Note: Fugitive sources are assumed to be operative 24 hours per day, 365 days per year
 I.e., the emissions are calculated based upon the level of activity and are then an average amount is assumed to occur continuously

equations:

- a AP-42 Section 13.2.2 Unpaved Roads

$$E = (k * (s/12)^a * (W/3)^b) / (M/0.2)^c * (S/15) * ((365-p)/365)$$
 where:
 E = emissions in lb/VMT
 k = constant (lb/VMT) = 2.6 for PM10
 s = silt content (%) = 8%
 a = empirically-derived exponent = 0.8
 W = mean vehicle weight (tons) = 5
 b = empirically-derived exponent = 0.4
 M = baseline moisture content = 0.2
 c = empirically derived exponent = 0.3
 S = mean vehicle speed (mph) = 8
 p = mean number of days with > 0.01 inches of precipitation = 110
- b assumes total activity 1958 to 1988 (see J. Kelly spreadsheet)
 total tons shipped = 138,207 over 31 years = 4458 tpy = 0.51 tph
 This amount is transferred twice, once from rail to site and then from silo to hopper (neither of these transfer points are covered by the baghouse system) = 1.02 lph
 Waste pile: assume 170 tpy is waste = 154 Mg/y = 0.017 Mg/h = 17 kg/h
- c assumes 1/2 of product shipped by truck, and
 each truck carries 2 tons of product, and
 total amount of product shipped = 4458-170 = 4288 tpy, and
 therefore there are 4288 / 2 / 2 = 1072 truck trips per year, and
 each truck travels 100 meters = 0.062 miles
- d Emission factor for rail unloading from AP-42 Section 11.28 Vermiculite Processing
 No emission factors are available for rail loading and truck loading
 The assumption is made that loading emissions are 1/2 of unloading emissions
- e assumes total product loaded = amount unloaded (4458 tpy) minus waste (=170 tpy), and
 1/2 is by truck and 1/2 is by rail

Attachment 2 - Emissions.xls - Fugitives

- f AP-42 section 13.2.5-1 Industrial Wind Erosion
 - E (g/m²) = k * sum over number of days with disturbances per year (erosion potential)
 - k = 0.5 for PM10
 - number of days with disturbances per year assumed to be 365
 - erosion potential = $58 \cdot (u^* - u_{t^*})^2 + 25 \cdot (u^* - u_{t^*})$
 - u^* = friction velocity for the fastest mile of wind for period between disturbances
 - u_{t^*} = threshold friction velocity = 0.54 (assumed equivalent to fine coal dust)
- g AP-42 Section 13.2.4 Aggregate Handling and Storage Piles (material drop)
 - E (kg/Mg) = k * 0.0016 * ((U/2.2)^{1.3} / (M/2)^{1.4})
 - where:
 - K = particle size multiplier = 0.35 for PM10
 - U = mean wind speed (mph) = 11
 - M = material moisture content (%) = 0.25
- h The percent tremolite is taken from a fax from J. Kelly showing the results of soils testing in the area around the facility

note: density of tremolite assumed to be 3.3e7 fibers/mg = 3.3e4 fibers/ug = 3.03e-5 ug/fiber
fibers have approximate dimensions of 0.5 um x 25 um
OSHA level = 0.1 fibers/cc = 5E-13 g/cc = 0.5 ug/m3
MDH Indoor level = 0.01 fibers/cc = 5E-14 g/cc = 0.05 ug/m3
 $ug/m^3 \cdot 3.3e7 \text{ fibers/mg} \cdot 10e-3 \text{ mg/ug} \cdot 10e-6 \text{ m}^3/\text{cc} = \text{fibers/cc}$ [i.e., $ug/m^3 \cdot 3.3e-2 = \text{fibers/cc}$]
 $ug/m^3/\text{time} \cdot 3.3e-7 \text{ fibers/mg} \cdot 10e-3 \text{ mg/ug} = \text{fibers/m}^2/\text{time}$ [i.e., $ug/m^2/\text{time} \cdot 3.3e4 = \text{fibers/m}^2/\text{time}$]

Note:

PER CONC = Long-term average airborne tremolite fiber concentration (ug/m³ = micrograms per cubic meter)
 24HR CONC = The maximum 24-hour average airborne tremolite fiber concentration (ug/m³)
 1HR CONC = The maximum 1-hour average airborne tremolite fiber concentration (ug/m³)
 PER DEP = Total deposition of tremolite fibers (g/m² = grams per square meter)

The Pre-baghouse time period was considered to be 20 years (1952 to 1972)

The Post-baghouse time period was considered to be 18 years (1972 - 1989)

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|--------------|--|------------|----------------|----------------|----------------------|
| 1 | 616 | 22ND AVE N E | 053-1102924310165 RALPH W BRZOSEK | 55418 | 479710 | 4984067 | 260 |
| 2 | 612 | 22ND AVE N E | 053-1102924310166 MARK PLATT | 55418 | 479700 | 4984067 | 260 |
| 3 | 2115 | 6TH ST N E | 053-1102924310168 FRANK P & DORYCE J SURMA | 55418 | 479676 | 4984057 | 260 |
| 4 | 528 | 19TH AVE N E | 053-1102924340001 R L LYNK & L R LYNK | 55418 | 479629 | 4983794 | 260 |
| 5 | 518 | 19TH AVE N E | 053-1102924340004 MELINDA THRELKELD ALLEN | 55418 | 479600 | 4983794 | 260 |
| 6 | 516 | 19TH AVE N E | 053-1102924340005 JOSEPH A GERDES | 55418 | 479588 | 4983794 | 260 |
| 7 | 508 | 19TH AVE N E | 053-1102924340006 AARON T HANSEN | 55418 | 479575 | 4983795 | 260 |
| 8 | 1827 | 5TH ST N E | 053-1102924340007 J T GERLACH & G S JOHNSON | 55418 | 479552 | 4983801 | 260 |
| 9 | 1821 | 5TH ST N E | 053-1102924340008 JOHN DENNIS | 55418 | 479552 | 4983788 | 260 |
| 10 | 1818 | 6TH ST N E | 053-1102924340009 DAVID JOSEPH GRANT | 55418 | 479615 | 4983772 | 260 |
| 11 | 1812 | 6TH ST N E | 053-1102924340010 PETER A VARIAN ETAL | 55418 | 479610 | 4983757 | 260 |
| 12 | 1808 | 6TH ST N E | 053-1102924340011 FRANK J SEMANKO ETAL | 55418 | 479610 | 4983739 | 260 |
| 13 | 1804 | 6TH ST N E | 053-1102924340012 J S GRIVNA ET AL W/L EST | 55418 | 479610 | 4983722 | 260 |
| 14 | 2000 | 6TH ST N E | 053-1102924340059 S G ROOK & L M BELLANGER | 55418 | 479611 | 4983955 | 260 |
| 15 | 2008 | 6TH ST N E | 053-1102924340060 K F SAUNDERS & K A SAUNDERS | 55418 | 479611 | 4983969 | 260 |
| 16 | 2012 | 6TH ST N E | 053-1102924340061 G A LARSEN & J G LARSEN | 55418 | 479611 | 4983983 | 260 |
| 17 | 2014 | 6TH ST N E | 053-1102924340062 TIMOTHY DONOVAN | 55418 | 479611 | 4983995 | 259 |
| 18 | 2109 | 6TH ST N E | 053-1102924340074 GARY ANTONY BROWN | 55418 | 479681 | 4984039 | 260 |
| 19 | 2103 | 6TH ST N E | 053-1102924340075 R & R E O'BRIEN | 55418 | 479681 | 4984023 | 260 |
| 20 | 2019 | 6TH ST N E | 053-1102924340076 GEORGE B BAVOLAK SUBJ/LE | 55418 | 479681 | 4984007 | 260 |
| 21 | 2015 | 6TH ST N E | 053-1102924340077 BANKERS TRST CO CA NA TRSTEE | 55418 | 479680 | 4983990 | 260 |
| 22 | 2007 | 6TH ST N E | 053-1102924340078 HENRY DARBY | 55418 | 479672 | 4983974 | 260 |
| 23 | 611 | 20TH AVE N E | 053-1102924340079 COLLEEN M CAMPBELL | 55418 | 479697 | 4983965 | 260 |
| 24 | 2003 | 6TH ST N E | 053-1102924340080 JOSEPH L NIZNIK | 55418 | 479672 | 4983956 | 260 |
| 25 | 1919 | 6TH ST N E | 053-1102924340081 CLETUS J MROZLA ETAL | 55418 | 479681 | 4983889 | 260 |
| 26 | 1915 | 6TH ST N E | 053-1102924340082 JAMES JEZIORSKI | 55418 | 479681 | 4983877 | 260 |
| 27 | 1913 | 6TH ST N E | 053-1102924340083 SEC PACIFIC NATL BK TRSTEE | 55418 | 479681 | 4983866 | 261 |
| 28 | 609 | 19TH AVE N E | 053-1102924340084 DONALD S HEBEISEN | 55418 | 479687 | 4983844 | 261 |
| 29 | 605 | 19TH AVE N E | 053-1102924340085 MARGARET KOBS ET AL W/L EST | 55418 | 479674 | 4983844 | 261 |
| 30 | 611 | 19TH AVE N E | 053-1102924340086 MARIA HORISHNYK | 55418 | 479700 | 4983844 | 261 |

Note:

PER CONC = Long-term average airborne tremolite fiber concentration (ug/m³ = micrograms per cubic meter)24HR CONC = The maximum 24-hour average airborne tremolite fiber concentration (ug/m³)1HR CONC = The maximum 1-hour average airborne tremolite fiber concentration (ug/m³)YY-YY DEP = Total deposition of tremolite fibers (fibers/m² = fibers per square meter)

The Pre-baghouse time period (YY-YY) was considered to be 36 years (1936 to 1972)

The Post-baghouse time period (YY-YY) was considered to be 18 years (1972 - 1989)

| HOUSENO | STREET | POST-BAGHOUSE CASE | | | | PRE-BAGHOUSE CASE | | | | Total | |
|---------|--------|--------------------|------------|-----------|------------|-------------------|------------|-----------|------------|------------|--------|
| | | PER CONC | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | | |
| 1 | 616 | 22ND AVE N E | 0.00003564 | 887 | 0.00042603 | 0.00342969 | 0.00044616 | 19,780 | 0.00570867 | 0.04378209 | 20,668 |
| 2 | 612 | 22ND AVE N E | 0.00003531 | 872 | 0.00041382 | 0.00354816 | 0.00044088 | 19,450 | 0.00555588 | 0.04425762 | 20,322 |
| 3 | 2115 | 6TH ST N E | 0.00003498 | 854 | 0.00038049 | 0.00386397 | 0.00043824 | 19,067 | 0.00511599 | 0.04929639 | 19,922 |
| 4 | 528 | 19TH AVE N E | 0.00003597 | 971 | 0.00061347 | 0.00562617 | 0.00043758 | 21,295 | 0.00697389 | 0.06971943 | 22,265 |
| 5 | 518 | 19TH AVE N E | 0.00002970 | 820 | 0.00055110 | 0.00510873 | 0.00036069 | 17,980 | 0.00644061 | 0.06477537 | 18,800 |
| 6 | 516 | 19TH AVE N E | 0.00002739 | 767 | 0.00052734 | 0.00486948 | 0.00033495 | 16,858 | 0.00622083 | 0.06225747 | 17,625 |
| 7 | 508 | 19TH AVE N E | 0.00002508 | 710 | 0.00049995 | 0.00457842 | 0.00030690 | 15,593 | 0.00596145 | 0.05906043 | 16,303 |
| 8 | 1827 | 5TH ST N E | 0.00002277 | 647 | 0.00046167 | 0.00427845 | 0.00027753 | 14,207 | 0.00554301 | 0.05560137 | 14,854 |
| 9 | 1821 | 5TH ST N E | 0.00002112 | 619 | 0.00045078 | 0.00382800 | 0.00026070 | 13,597 | 0.00548361 | 0.05031345 | 14,216 |
| 10 | 1818 | 6TH ST N E | 0.00002838 | 808 | 0.00056859 | 0.00461076 | 0.00034650 | 17,741 | 0.00678348 | 0.05945973 | 18,549 |
| 11 | 1812 | 6TH ST N E | 0.00002475 | 733 | 0.00053196 | 0.00387618 | 0.00030525 | 16,115 | 0.00645414 | 0.05154171 | 16,848 |
| 12 | 1808 | 6TH ST N E | 0.00002211 | 676 | 0.00050622 | 0.00424479 | 0.00027324 | 14,872 | 0.00621786 | 0.04955313 | 15,548 |
| 13 | 1804 | 6TH ST N E | 0.00002013 | 638 | 0.00047784 | 0.00523677 | 0.00025146 | 14,042 | 0.00593769 | 0.06261915 | 14,680 |
| 14 | 2000 | 6TH ST N E | 0.00003993 | 936 | 0.00041382 | 0.00329934 | 0.00048906 | 20,630 | 0.00541101 | 0.04368309 | 21,566 |
| 15 | 2008 | 6TH ST N E | 0.00003861 | 908 | 0.00040029 | 0.00323169 | 0.00047421 | 20,016 | 0.00534633 | 0.04313562 | 20,923 |
| 16 | 2012 | 6TH ST N E | 0.00003729 | 879 | 0.00038610 | 0.00315282 | 0.00046002 | 19,452 | 0.00515097 | 0.04183080 | 20,331 |
| 17 | 2014 | 6TH ST N E | 0.00003597 | 853 | 0.00036135 | 0.00301521 | 0.00044352 | 18,887 | 0.00481602 | 0.03973860 | 19,740 |
| 18 | 2109 | 6TH ST N E | 0.00003729 | 906 | 0.00040953 | 0.00393459 | 0.00046662 | 20,220 | 0.00549351 | 0.04996035 | 21,126 |
| 19 | 2103 | 6TH ST N E | 0.00003927 | 946 | 0.00042999 | 0.00380820 | 0.00048906 | 21,087 | 0.00575916 | 0.04819122 | 22,033 |
| 20 | 2019 | 6TH ST N E | 0.00004125 | 990 | 0.00044220 | 0.00401082 | 0.00051381 | 22,039 | 0.00590997 | 0.04951419 | 23,029 |
| 21 | 2015 | 6TH ST N E | 0.00004356 | 1,037 | 0.00044121 | 0.00404448 | 0.00054054 | 23,069 | 0.00588258 | 0.04981317 | 24,106 |
| 22 | 2007 | 6TH ST N E | 0.00004488 | 1,060 | 0.00043758 | 0.00365112 | 0.00055440 | 23,534 | 0.00580833 | 0.04844730 | 24,594 |
| 23 | 611 | 20TH AVE N E | 0.00004950 | 1,165 | 0.00046893 | 0.00411972 | 0.00060918 | 25,896 | 0.00621522 | 0.05053389 | 27,062 |
| 24 | 2003 | 6TH ST N E | 0.00004719 | 1,110 | 0.00046398 | 0.00364782 | 0.00058179 | 24,594 | 0.00614559 | 0.04791303 | 25,703 |
| 25 | 1919 | 6TH ST N E | 0.00005940 | 1,366 | 0.00060588 | 0.00428934 | 0.00071742 | 30,011 | 0.00771705 | 0.05562447 | 31,377 |
| 26 | 1915 | 6TH ST N E | 0.00006072 | 1,398 | 0.00064020 | 0.00417318 | 0.00073260 | 30,666 | 0.00824868 | 0.05392497 | 32,065 |
| 27 | 1913 | 6TH ST N E | 0.00006237 | 1,432 | 0.00070950 | 0.00453519 | 0.00075174 | 31,393 | 0.00920799 | 0.05827074 | 32,824 |
| 28 | 609 | 19TH AVE N E | 0.00006468 | 1,495 | 0.00082467 | 0.00502722 | 0.00077979 | 32,716 | 0.01085502 | 0.06459387 | 34,210 |
| 29 | 605 | 19TH AVE N E | 0.00005973 | 1,396 | 0.00078969 | 0.00489918 | 0.00072039 | 30,530 | 0.01049367 | 0.06362598 | 31,926 |
| 30 | 611 | 19TH AVE N E | 0.00006996 | 1,599 | 0.00084579 | 0.00509916 | 0.00084051 | 35,018 | 0.01102926 | 0.06542613 | 36,617 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|--------------|--|------------|----------------|----------------|----------------------|
| 31 | 601 | 19TH AVE N E | 053-1102924340087 FLORENCE M IVERSON | 55418 | 479661 | 4983844 | 260 |
| 32 | 527 | 19TH AVE N E | 053-1102924340088 HERMAN JOHNSON | 55418 | 479629 | 4983844 | 260 |
| 33 | 521 | 19TH AVE N E | 053-1102924340089 BARBARA A HALL | 55418 | 479604 | 4983844 | 260 |
| 34 | 517 | 19TH AVE N E | 053-1102924340090 JOHN C RICH & VERA F MCHUGH | 55418 | 479592 | 4983844 | 260 |
| 35 | 525 | 19TH AVE N E | 053-1102924340091 M M KAMMEYER-MUELLER ET AL | 55418 | 479617 | 4983844 | 260 |
| 36 | 1912 | 6TH ST N E | 053-1102924340092 THOMAS A JENEWEIN | 55418 | 479611 | 4983874 | 260 |
| 37 | 1910 | 6TH ST N E | 053-1102924340093 CATHERINE J GALLAGHER | 55418 | 479610 | 4983865 | 260 |
| 38 | 1918 | 6TH ST N E | 053-1102924340094 G A & S FLOWER | 55418 | 479611 | 4983886 | 260 |
| 39 | 1919 | 5TH ST N E | 053-1102924340095 FRANK E MARTIN JR | 55418 | 479561 | 4983887 | 260 |
| 40 | 1913 | 5TH ST N E | 053-1102924340096 D J HOCKER & K K HOCKER | 55418 | 479561 | 4983870 | 260 |
| 41 | 509 | 19TH AVE N E | 053-1102924340097 STEPHEN R ANDERSON ETAL | 55418 | 479568 | 4983844 | 260 |
| 42 | 513 | 19TH AVE N E | 053-1102924340098 KUM OK HWANG | 55418 | 479580 | 4983844 | 260 |
| 43 | 1901 | 5TH ST N E | 053-1102924340099 DAVID ASSELSTINE | 55418 | 479543 | 4983844 | 260 |
| 44 | 505 | 19TH AVE N E | 053-1102924340100 VICTORIA L SPENCER | 55418 | 479556 | 4983844 | 260 |
| 45 | 1810 | 5TH ST N E | 053-1102924340115 EDMUND CONTOSKI | 55418 | 479490 | 4983729 | 261 |
| 46 | 1812 | 5TH ST N E | 053-1102924340116 SHARI S SEYMOUR ET AL | 55418 | 479490 | 4983748 | 260 |
| 47 | 1816 | 5TH ST N E | 053-1102924340117 G P FRISCO ETAL | 55418 | 479490 | 4983758 | 260 |
| 48 | 1818 | 5TH ST N E | 053-1102924340118 E A POMMIER & J A POMMIER | 55418 | 479490 | 4983769 | 260 |
| 49 | 501 | 18TH AVE N E | 053-1102924340122 N P RY CO | 55418 | 479585 | 4983710 | 260 |
| 50 | 1819 | 5TH ST N E | 053-1102924340123 MITCHEL R BROZYNA ETAL | 55418 | 479560 | 4983767 | 260 |
| 51 | 1815 | 5TH ST N E | 053-1102924340124 P R & E KOSTIK | 55418 | 479560 | 4983748 | 260 |
| 52 | 1809 | 5TH ST N E | 053-1102924340125 MARY JO STATHES | 55418 | 479560 | 4983727 | 260 |
| 53 | 1819 | 6TH ST N E | 053-1102924340126 BANKERS TRUST CO CALIF TRSTE | 55418 | 479680 | 4983764 | 260 |
| 54 | 1813 | 6TH ST N E | 053-1102924340127 L CHOEGYAL & N WANGMO | 55418 | 479680 | 4983748 | 260 |
| 55 | 1809 | 6TH ST N E | 053-1102924340128 L O & M A COGSWELL | 55418 | 479680 | 4983733 | 260 |
| 56 | 1805 | 6TH ST N E | 053-1102924340129 P & K SUPER | 55418 | 479680 | 4983721 | 260 |
| 57 | 1724 | 6TH ST N E | 053-1102924340134 DONALD F SEXTER ET AL | 55413 | 479585 | 4983653 | 260 |
| 58 | 1730 | 6TH ST N E | 053-1102924340135 T A KLESK & C V MUEHLHAUSER | 55413 | 479605 | 4983672 | 260 |
| 59 | 1731 | 5TH ST N E | 053-1102924340136 J KORZENIOWSKI ETAL | 55413 | 479549 | 4983670 | 261 |
| 60 | 1722 | 5TH ST N E | 053-1102924340137 JANICE M RAYGOZA | 55413 | 479490 | 4983654 | 261 |
| 61 | 1730 | 5TH ST N E | 053-1102924340138 MYROL MILTON BOONE | 55413 | 479495 | 4983680 | 261 |
| 62 | 1724 | 5TH ST N E | 053-1102924340139 JOSEPH SIMMONS | 55413 | 479483 | 4983673 | 260 |
| 63 | 614 | 20TH AVE N E | 053-1102924340147 EUGENE GABRISH | 55418 | 479711 | 4983911 | 260 |
| 64 | 612 | 20TH AVE N E | 053-1102924340148 MATHEOS K BALAFAS ET AL | 55418 | 479701 | 4983911 | 260 |
| 65 | 606 | 20TH AVE N E | 053-1102924340149 S HEMRAJ ET AL | 55418 | 479688 | 4983911 | 260 |
| 66 | 604 | 20TH AVE N E | 053-1102924340150 S J WOLYNIEC & C M FRAME | 55418 | 479674 | 4983911 | 260 |
| 67 | 600 | 20TH AVE N E | 053-1102924340151 JOSEF KOLODNYCKYJ ETAL | 55418 | 479662 | 4983911 | 260 |
| 68 | 528 | 20TH AVE N E | 053-1102924340160 JEFFREY W MORITKO | 55418 | 479626 | 4983911 | 260 |

| HOUSENO | STREET | POST-BAGHOUSE CASE | | | | PRE-BAGHOUSE CASE | | | | Total | |
|---------|--------|--------------------|------------|-----------|------------|-------------------|------------|-----------|------------|------------|--------|
| | | PER CONC | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | | |
| 31 | 601 | 19TH AVE N E | 0.00005511 | 1,310 | 0.00073623 | 0.00454113 | 0.00066429 | 28,657 | 0.00982971 | 0.05911818 | 29,967 |
| 32 | 527 | 19TH AVE N E | 0.00004488 | 1,104 | 0.00059499 | 0.00397188 | 0.00054384 | 24,146 | 0.00806982 | 0.05175027 | 25,250 |
| 33 | 521 | 19TH AVE N E | 0.00003861 | 969 | 0.00048675 | 0.00376398 | 0.00046662 | 21,188 | 0.00666897 | 0.04903173 | 22,157 |
| 34 | 517 | 19TH AVE N E | 0.00003564 | 909 | 0.00044451 | 0.00369963 | 0.00043296 | 19,887 | 0.00596970 | 0.04848129 | 20,796 |
| 35 | 525 | 19TH AVE N E | 0.00004158 | 1,037 | 0.00054153 | 0.00378213 | 0.00050490 | 22,689 | 0.00738408 | 0.04897002 | 23,726 |
| 36 | 1912 | 6TH ST N E | 0.00004290 | 1,028 | 0.00059400 | 0.00381909 | 0.00051777 | 22,443 | 0.00796785 | 0.05035008 | 23,471 |
| 37 | 1910 | 6TH ST N E | 0.00004224 | 1,026 | 0.00058905 | 0.00374616 | 0.00051249 | 22,439 | 0.00795135 | 0.04959933 | 23,466 |
| 38 | 1918 | 6TH ST N E | 0.00004323 | 1,029 | 0.00058476 | 0.00374055 | 0.00052437 | 22,515 | 0.00778998 | 0.04901325 | 23,543 |
| 39 | 1919 | 5TH ST N E | 0.00003399 | 835 | 0.00048345 | 0.00323136 | 0.00041151 | 18,266 | 0.00657195 | 0.04264029 | 19,101 |
| 40 | 1913 | 5TH ST N E | 0.00003234 | 817 | 0.00043659 | 0.00314226 | 0.00039435 | 17,889 | 0.00598257 | 0.04166976 | 18,707 |
| 41 | 509 | 19TH AVE N E | 0.00003102 | 808 | 0.00043263 | 0.00391974 | 0.00037620 | 17,672 | 0.00510642 | 0.04883241 | 18,479 |
| 42 | 513 | 19TH AVE N E | 0.00003333 | 860 | 0.00043791 | 0.00382107 | 0.00040458 | 18,824 | 0.00534303 | 0.04747314 | 19,684 |
| 43 | 1901 | 5TH ST N E | 0.00002673 | 714 | 0.00041844 | 0.00402699 | 0.00032538 | 15,634 | 0.00470316 | 0.05093847 | 16,348 |
| 44 | 505 | 19TH AVE N E | 0.00002871 | 762 | 0.00042768 | 0.00400884 | 0.00035046 | 16,654 | 0.00490050 | 0.05036823 | 17,415 |
| 45 | 1810 | 5TH ST N E | 0.00001155 | 385 | 0.00032010 | 0.00409167 | 0.00014619 | 8,465 | 0.00413919 | 0.05236143 | 8,849 |
| 46 | 1812 | 5TH ST N E | 0.00001254 | 404 | 0.00033132 | 0.00354948 | 0.00015609 | 8,886 | 0.00422202 | 0.04445661 | 9,290 |
| 47 | 1816 | 5TH ST N E | 0.00001320 | 416 | 0.00033726 | 0.00317493 | 0.00016236 | 9,136 | 0.00427812 | 0.03950298 | 9,552 |
| 48 | 1818 | 5TH ST N E | 0.00001353 | 429 | 0.00034254 | 0.00274362 | 0.00016929 | 9,419 | 0.00432762 | 0.03395898 | 9,848 |
| 49 | 501 | 18TH AVE N E | 0.00001683 | 546 | 0.00045969 | 0.00513744 | 0.00021021 | 12,015 | 0.00566346 | 0.06378834 | 12,561 |
| 50 | 1819 | 5TH ST N E | 0.00001980 | 592 | 0.00044286 | 0.00326172 | 0.00024288 | 13,020 | 0.00545721 | 0.04380321 | 13,612 |
| 51 | 1815 | 5TH ST N E | 0.00001749 | 548 | 0.00042405 | 0.00368214 | 0.00021780 | 12,032 | 0.00528726 | 0.04435992 | 12,580 |
| 52 | 1809 | 5TH ST N E | 0.00001584 | 511 | 0.00039996 | 0.00464541 | 0.00019767 | 11,233 | 0.00505131 | 0.05726292 | 11,743 |
| 53 | 1819 | 6TH ST N E | 0.00004389 | 1,186 | 0.00076989 | 0.00639144 | 0.00053328 | 26,087 | 0.00876348 | 0.07834101 | 27,272 |
| 54 | 1813 | 6TH ST N E | 0.00003828 | 1,082 | 0.00073689 | 0.00535095 | 0.00047058 | 23,845 | 0.00861729 | 0.06893040 | 24,927 |
| 55 | 1809 | 6TH ST N E | 0.00003399 | 992 | 0.00069432 | 0.00461934 | 0.00041844 | 21,845 | 0.00822360 | 0.05832750 | 22,837 |
| 56 | 1805 | 6TH ST N E | 0.00003102 | 937 | 0.00065835 | 0.00584034 | 0.00038610 | 20,659 | 0.00786885 | 0.06420084 | 21,597 |
| 57 | 1724 | 6TH ST N E | 0.00001518 | 513 | 0.00048708 | 0.00310134 | 0.00019206 | 11,207 | 0.00659637 | 0.04023360 | 11,720 |
| 58 | 1730 | 6TH ST N E | 0.00001683 | 563 | 0.00049599 | 0.00363198 | 0.00021285 | 12,320 | 0.00654159 | 0.04808067 | 12,883 |
| 59 | 1731 | 5TH ST N E | 0.00001320 | 444 | 0.00041382 | 0.00301422 | 0.00016566 | 9,714 | 0.00554103 | 0.04080384 | 10,158 |
| 60 | 1722 | 5TH ST N E | 0.00001023 | 355 | 0.00035607 | 0.00239382 | 0.00013068 | 7,772 | 0.00486420 | 0.03206544 | 8,127 |
| 61 | 1730 | 5TH ST N E | 0.00001056 | 365 | 0.00032373 | 0.00307890 | 0.00013464 | 7,985 | 0.00429297 | 0.04148661 | 8,350 |
| 62 | 1724 | 5TH ST N E | 0.00001023 | 348 | 0.00032340 | 0.00263010 | 0.00012771 | 7,609 | 0.00434478 | 0.03566178 | 7,957 |
| 63 | 614 | 20TH AVE N E | 0.00006171 | 1,423 | 0.00057255 | 0.00438603 | 0.00075009 | 31,446 | 0.00753819 | 0.05603136 | 32,870 |
| 64 | 612 | 20TH AVE N E | 0.00005973 | 1,380 | 0.00057288 | 0.00433752 | 0.00072732 | 30,454 | 0.00756195 | 0.05582379 | 31,835 |
| 65 | 606 | 20TH AVE N E | 0.00005709 | 1,320 | 0.00055902 | 0.00420651 | 0.00069498 | 29,068 | 0.00740520 | 0.05481531 | 30,388 |
| 66 | 604 | 20TH AVE N E | 0.00005445 | 1,263 | 0.00053856 | 0.00408276 | 0.00066396 | 27,793 | 0.00708378 | 0.05363688 | 29,056 |
| 67 | 600 | 20TH AVE N E | 0.00005247 | 1,215 | 0.00053559 | 0.00397419 | 0.00063756 | 26,754 | 0.00674256 | 0.05173443 | 27,969 |
| 68 | 528 | 20TH AVE N E | 0.00004587 | 1,073 | 0.00050325 | 0.00348678 | 0.00055737 | 23,558 | 0.00654621 | 0.04520736 | 24,631 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|----------------|--|------------|----------------|----------------|----------------------|
| 69 | 524 | 20TH AVE N E | 053-1102924340161 JAMES D BUMGARNER ETAL | 55418 | 479609 | 4983911 | 260 |
| 70 | 514 | 20TH AVE N E | 053-1102924340162 JANET LEA HARRIS | 55418 | 479591 | 4983911 | 260 |
| 71 | 508 | 20TH AVE N E | 053-1102924340163 B SMITH & P LUBANSKY | 55418 | 479573 | 4983911 | 260 |
| 72 | 1927 | 5TH ST N E | 053-1102924340164 L K HANSON & R W WINKELMEYER | 55418 | 479550 | 4983920 | 260 |
| 73 | 1923 | 5TH ST N E | 053-1102924340165 R & J ZIMBRICK | 55418 | 479550 | 4983903 | 260 |
| 74 | 426 | 19TH AVE N E | 053-1102924340166 KENNETH A KRENZ | 55418 | 479511 | 4983792 | 260 |
| 75 | 424 | 19TH AVE N E | 053-1102924340167 JANE J HUGDAHL | 55418 | 479502 | 4983793 | 260 |
| 76 | 614 | 19TH AVE N E | 053-1102924340177 BRADLEY J STEINER | 55418 | 479719 | 4983792 | 261 |
| 77 | 612 | 19TH AVE N E | 053-1102924340178 T A & J BRAAMA | 55418 | 479710 | 4983792 | 261 |
| 78 | 610 | 19TH AVE N E | 053-1102924340179 DARREL L PERSSON | 55418 | 479701 | 4983792 | 261 |
| 79 | 608 | 19TH AVE N E | 053-1102924340180 DONALD D STENEHJEM | 55418 | 479692 | 4983791 | 260 |
| 80 | 606 | 19TH AVE N E | 053-1102924340181 ROLAND A WEYRAUCH ETAL | 55418 | 479683 | 4983791 | 260 |
| 81 | 1823 | 6TH ST N E | 053-1102924340182 MARC ALLEN THOMPSON | 55418 | 479667 | 4983791 | 260 |
| 82 | 615 | 19TH AVE N E | 053-1102924340183 WALTER ARTHUR HODGES | 55418 | 479712 | 4983844 | 261 |
| 83 | 1729 | 6TH ST N E | 053-1102924340190 A F & H DALEKI | 55413 | 479690 | 4983680 | 260 |
| 84 | 524 | 19TH AVE N E | 053-1102924340231 DARRYL & SOKHAMONY MCKINNON | 55418 | 479613 | 4983794 | 260 |
| 85 | 701 | 22ND AVE N E | 053-1102924410064 JOHN A COLBURN | 55418 | 480140 | 4984106 | 258 |
| 86 | 709 | 22ND AVE N E | 053-1102924410065 TARA L GANTTER | 55418 | 480164 | 4984106 | 258 |
| 87 | 705 | 22ND AVE N E | 053-1102924410066 MARKLEY R WARD ET AL SUBJ/LE | 55418 | 480152 | 4984106 | 258 |
| 88 | 711 | 22ND AVE N E | 053-1102924410067 ISLAMIC RELIEF & SOCIAL SRVS | 55418 | 480176 | 4984106 | 257 |
| 89 | 2211 | MONROE ST N E | 053-1102924410068 LEON D LEWIS & BETTY G LEWIS | 55418 | 480158 | 4984126 | 258 |
| 90 | 808 | 22ND AVE N E | 053-1102924410105 CITY OF MINNEAPOLIS | 55418 | 480291 | 4984052 | 257 |
| 91 | 804 | 22ND AVE N E | 053-1102924410106 CITY OF MINNEAPOLIS | 55418 | 480278 | 4984052 | 257 |
| 92 | 800 | 22ND AVE N E | 053-1102924410107 CITY OF MINNEAPOLIS | 55418 | 480265 | 4984053 | 257 |
| 93 | 2200 | MONROE ST N E | 053-1102924420101 DORIS E EKSTROM | 55418 | 480099 | 4984114 | 258 |
| 94 | 2206 | MONROE ST N E | 053-1102924420102 C & B J HALLINGSTAD | 55418 | 480099 | 4984131 | 258 |
| 95 | 2212 | MONROE ST N E | 053-1102924420103 WAYNE D WARNE ETAL | 55418 | 480099 | 4984148 | 258 |
| 96 | 681 | 22ND AVE N E | 053-1102924420107 BARBARA J SKOKAN | 55418 | 480032 | 4984123 | 258 |
| 97 | 689 | 22ND AVE N E | 053-1102924420108 LAWRENCE R BARCHINSKI ET AL | 55418 | 480057 | 4984123 | 258 |
| 98 | 685 | 22ND AVE N E | 053-1102924420109 WAYNE LIEPKIE | 55418 | 480044 | 4984123 | 258 |
| 99 | 2216 | HOWARD ST N E | 053-1102924420110 GEORGE E MACKERETH | 55418 | 480045 | 4984162 | 259 |
| 100 | 2212 | HOWARD ST N E | 053-1102924420111 PATRICIA HUGHES | 55418 | 480045 | 4984145 | 259 |
| 101 | 2215 | MADISON ST N E | 053-1102924420118 S R SCHLESINGER ET AL | 55418 | 480006 | 4984162 | 259 |
| 102 | 2213 | MADISON ST N E | 053-1102924420119 J F & C L CREWS-ERJAVEC | 55418 | 480007 | 4984151 | 259 |
| 103 | 2209 | MADISON ST N E | 053-1102924420120 ROBERT T UPHAM | 55418 | 480007 | 4984140 | 259 |
| 104 | 673 | 22ND AVE N E | 053-1102924420121 J & M RUDNIK | 55418 | 479997 | 4984120 | 259 |
| 105 | 677 | 22ND AVE N E | 053-1102924420122 BARTHOLOMEW F DABROWSKI | 55418 | 480016 | 4984120 | 259 |
| 106 | 2200 | MADISON ST N E | 053-1102924420123 MARGARET ELAINE FAAS | 55418 | 479949 | 4984115 | 259 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | | Total | |
|---------|--------|----------------|--------------------|-----------|------------|-------------------|------------|-----------|------------|------------|--------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | | |
| 69 | 524 | 20TH AVE N E | 0.00004290 | 1,009 | 0.00051117 | 0.00343992 | 0.00052008 | 22,128 | 0.00671352 | 0.04502058 | 23,137 |
| 70 | 514 | 20TH AVE N E | 0.00003960 | 941 | 0.00051216 | 0.00337887 | 0.00048180 | 20,618 | 0.00679008 | 0.04459356 | 21,559 |
| 71 | 508 | 20TH AVE N E | 0.00003663 | 878 | 0.00050226 | 0.00326040 | 0.00044583 | 19,208 | 0.00670956 | 0.04302903 | 20,086 |
| 72 | 1927 | 5TH ST N E | 0.00003333 | 804 | 0.00046992 | 0.00309837 | 0.00040590 | 17,598 | 0.00631224 | 0.04114209 | 18,403 |
| 73 | 1923 | 5TH ST N E | 0.00003267 | 802 | 0.00047751 | 0.00313962 | 0.00039930 | 17,521 | 0.00646602 | 0.04193607 | 18,323 |
| 74 | 426 | 19TH AVE N E | 0.00001716 | 514 | 0.00038643 | 0.00315612 | 0.00021285 | 11,294 | 0.00476454 | 0.04214298 | 11,808 |
| 75 | 424 | 19TH AVE N E | 0.00001650 | 495 | 0.00037389 | 0.00299013 | 0.00020361 | 10,892 | 0.00462759 | 0.04008411 | 11,387 |
| 76 | 614 | 19TH AVE N E | 0.00007326 | 1,743 | 0.00084282 | 0.00601986 | 0.00087846 | 38,220 | 0.01137510 | 0.07574424 | 39,963 |
| 77 | 612 | 19TH AVE N E | 0.00006732 | 1,624 | 0.00077583 | 0.00590304 | 0.00080817 | 35,592 | 0.01017258 | 0.07496148 | 37,216 |
| 78 | 610 | 19TH AVE N E | 0.00006237 | 1,534 | 0.00076890 | 0.00602910 | 0.00075339 | 33,666 | 0.00941853 | 0.07346130 | 35,200 |
| 79 | 608 | 19TH AVE N E | 0.00005775 | 1,440 | 0.00074580 | 0.00597927 | 0.00069465 | 31,571 | 0.00892188 | 0.06940296 | 33,011 |
| 80 | 606 | 19TH AVE N E | 0.00005346 | 1,356 | 0.00073359 | 0.00605583 | 0.00064647 | 29,742 | 0.00854238 | 0.07102920 | 31,097 |
| 81 | 1823 | 6TH ST N E | 0.00004719 | 1,219 | 0.00070026 | 0.00606903 | 0.00056925 | 26,740 | 0.00787017 | 0.07258779 | 27,959 |
| 82 | 615 | 19TH AVE N E | 0.00007524 | 1,705 | 0.00084909 | 0.00520113 | 0.00090321 | 37,392 | 0.01094808 | 0.06593499 | 39,097 |
| 83 | 1729 | 6TH ST N E | 0.00002739 | 871 | 0.00074217 | 0.00556743 | 0.00034155 | 19,081 | 0.00923175 | 0.06871557 | 19,952 |
| 84 | 524 | 19TH AVE N E | 0.00003234 | 883 | 0.00058014 | 0.00536646 | 0.00039270 | 19,358 | 0.00670164 | 0.06736455 | 20,241 |
| 85 | 701 | 22ND AVE N E | 0.00003069 | 824 | 0.00048345 | 0.00367026 | 0.00036861 | 18,303 | 0.00586245 | 0.04438335 | 19,128 |
| 86 | 709 | 22ND AVE N E | 0.00003036 | 796 | 0.00051150 | 0.00349338 | 0.00036630 | 17,673 | 0.00641091 | 0.04177833 | 18,469 |
| 87 | 705 | 22ND AVE N E | 0.00003036 | 810 | 0.00050226 | 0.00358083 | 0.00036729 | 17,996 | 0.00620103 | 0.04386591 | 18,806 |
| 88 | 711 | 22ND AVE N E | 0.00003003 | 775 | 0.00050556 | 0.00332343 | 0.00035904 | 17,188 | 0.00633039 | 0.03988380 | 17,963 |
| 89 | 2211 | MONROE ST N E | 0.00002838 | 752 | 0.00046992 | 0.00347655 | 0.00034155 | 16,693 | 0.00582054 | 0.04308348 | 17,445 |
| 90 | 808 | 22ND AVE N E | 0.00003003 | 687 | 0.00041448 | 0.00353331 | 0.00036333 | 15,377 | 0.00490611 | 0.04326828 | 16,063 |
| 91 | 804 | 22ND AVE N E | 0.00003102 | 710 | 0.00041976 | 0.00363693 | 0.00037290 | 15,905 | 0.00493845 | 0.04537302 | 16,616 |
| 92 | 800 | 22ND AVE N E | 0.00003168 | 737 | 0.00041745 | 0.00370656 | 0.00038247 | 16,470 | 0.00540870 | 0.04549710 | 17,206 |
| 93 | 2200 | MONROE ST N E | 0.00003003 | 855 | 0.00038577 | 0.00316800 | 0.00036597 | 19,054 | 0.00489324 | 0.04117443 | 19,909 |
| 94 | 2206 | MONROE ST N E | 0.00002805 | 808 | 0.00037554 | 0.00299640 | 0.00034452 | 17,992 | 0.00480612 | 0.03936570 | 18,800 |
| 95 | 2212 | MONROE ST N E | 0.00002640 | 762 | 0.00036531 | 0.00287496 | 0.00032472 | 16,988 | 0.00470910 | 0.03783186 | 17,750 |
| 96 | 681 | 22ND AVE N E | 0.00002937 | 901 | 0.00043065 | 0.00329142 | 0.00036663 | 20,131 | 0.00535062 | 0.04336035 | 21,031 |
| 97 | 689 | 22ND AVE N E | 0.00002937 | 880 | 0.00040854 | 0.00317262 | 0.00036498 | 19,693 | 0.00525129 | 0.04187073 | 20,573 |
| 98 | 685 | 22ND AVE N E | 0.00002937 | 892 | 0.00043098 | 0.00331155 | 0.00036663 | 19,949 | 0.00540870 | 0.04388604 | 20,841 |
| 99 | 2216 | HOWARD ST N E | 0.00002541 | 779 | 0.00038808 | 0.00307164 | 0.00032142 | 17,442 | 0.00489852 | 0.04110645 | 18,221 |
| 100 | 2212 | HOWARD ST N E | 0.00002706 | 824 | 0.00040722 | 0.00319638 | 0.00034023 | 18,440 | 0.00513612 | 0.04270101 | 19,264 |
| 101 | 2215 | MADISON ST N E | 0.00002475 | 785 | 0.00034485 | 0.00296637 | 0.00031581 | 17,576 | 0.00435633 | 0.03987951 | 18,362 |
| 102 | 2213 | MADISON ST N E | 0.00002574 | 816 | 0.00035607 | 0.00304689 | 0.00032868 | 18,275 | 0.00449295 | 0.04089624 | 19,092 |
| 103 | 2209 | MADISON ST N E | 0.00002706 | 853 | 0.00036861 | 0.00313500 | 0.00034320 | 19,091 | 0.00464211 | 0.04199745 | 19,944 |
| 104 | 673 | 22ND AVE N E | 0.00002904 | 916 | 0.00036828 | 0.00343299 | 0.00036630 | 20,483 | 0.00458667 | 0.04567431 | 21,399 |
| 105 | 677 | 22ND AVE N E | 0.00002937 | 918 | 0.00040491 | 0.00319671 | 0.00037224 | 20,552 | 0.00511434 | 0.04192914 | 21,471 |
| 106 | 2200 | MADISON ST N E | 0.00002739 | 897 | 0.00034980 | 0.00343629 | 0.00034980 | 20,055 | 0.00462660 | 0.04550238 | 20,952 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|------------------------------------|------------------------------|------------|----------------|----------------|----------------------|
| 107 | 2208 | MADISON ST N E 053-1102924420124 | P KEW & S STANLEY | 55418 | 479949 | 4984134 | 259 |
| 108 | 2212 | MADISON ST N E 053-1102924420125 | THOMAS CHRISTENSEN ET AL | 55418 | 479949 | 4984151 | 259 |
| 109 | 2218 | MADISON ST N E 053-1102924420126 | SEC OF VETERANS AFFAIRS | 55418 | 479949 | 4984162 | 259 |
| 110 | 2201 | JEFFERSON ST N E 053-1102924420130 | FREDERICK N PUZAK ET AL | 55418 | 479911 | 4984157 | 260 |
| 111 | 2201 | ASHINGTON ST N E 053-1102924420135 | K O BELANGER III/T M SIMON | 55418 | 479814 | 4984115 | 260 |
| 112 | 2110 | ASHINGTON ST N E 053-1102924420148 | KUZMA PROPERTIES | 55418 | 479736 | 4984067 | 260 |
| 113 | 646 | 22ND AVE N E 053-1102924420150 | R J & L M SYLVESTER | 55418 | 479840 | 4984067 | 261 |
| 114 | 666 | 22ND AVE N E 053-1102924420161 | GRAHAM RESEARCH INC | 55418 | 479943 | 4984053 | 259 |
| 115 | 636 | 22ND AVE N E 053-1102924420163 | PATRICIA J FOSS | 55418 | 479798 | 4984067 | 261 |
| 116 | 2000 | ASHINGTON ST N E 053-1102924430001 | HARRIET M KORZENOWSKI | 55418 | 479742 | 4983956 | 260 |
| 117 | 613 | 20TH AVE N E 053-1102924430002 | MARTY P RICCI | 55418 | 479716 | 4983965 | 260 |
| 118 | 2008 | ASHINGTON ST N E 053-1102924430003 | ROBERT C ROYSTER | 55418 | 479742 | 4983973 | 260 |
| 119 | 2012 | ASHINGTON ST N E 053-1102924430004 | FLORENCE D ZAWISLAK | 55418 | 479731 | 4983989 | 260 |
| 120 | 2018 | ASHINGTON ST N E 053-1102924430005 | FRANK J BUSZTA & WIFE | 55418 | 479731 | 4984006 | 260 |
| 121 | 2102 | ASHINGTON ST N E 053-1102924430006 | ANN BUSZTA | 55418 | 479731 | 4984023 | 260 |
| 122 | 2106 | ASHINGTON ST N E 053-1102924430007 | EDWARD J SZCZECH | 55418 | 479731 | 4984039 | 260 |
| 123 | 655 | 20TH AVE N E 053-1102924430008 | NEECK CONSTRUCTION INC | 55418 | 479857 | 4983965 | 259 |
| 124 | 2009 | ASHINGTON ST N E 053-1102924430010 | NEECK CONSTRUCTION INC | 55418 | 479802 | 4983973 | 260 |
| 125 | 2001 | ASHINGTON ST N E 053-1102924430011 | ST JOHNS EVAN LUTH CHRCH INC | 55418 | 479802 | 4983956 | 260 |
| 126 | 1922 | MONROE ST N E 053-1102924430024 | UNIVERSAL PLATING/RUST PROF | 55418 | 480091 | 4983901 | 258 |
| 127 | 1922 | JEFFERSON ST N E 053-1102924430028 | JOHN K UTKE | 55418 | 479852 | 4983904 | 259 |
| 128 | 1928 | JEFFERSON ST N E 053-1102924430029 | BANKERS TRUST CO TRUSTEE | 55418 | 479852 | 4983920 | 260 |
| 129 | 640 | 20TH AVE N E 053-1102924430030 | TIMOTHY DEAN WELLMAN | 55418 | 479815 | 4983920 | 260 |
| 130 | 1927 | ASHINGTON ST N E 053-1102924430031 | BEVERLY J YOUNG | 55418 | 479790 | 4983920 | 260 |
| 131 | 1923 | ASHINGTON ST N E 053-1102924430032 | STEVEN J GRAF | 55418 | 479802 | 4983904 | 260 |
| 132 | 627 | 19TH AVE N E 053-1102924430033 | PATRICIA W NELSON | 55418 | 479751 | 4983844 | 260 |
| 133 | 619 | 19TH AVE N E 053-1102924430035 | J A GEREAU & L H BRADLEY | 55418 | 479725 | 4983844 | 261 |
| 134 | 623 | 19TH AVE N E 053-1102924430036 | BARBARA L JENSEN | 55418 | 479738 | 4983844 | 260 |
| 135 | 1912 | ASHINGTON ST N E 053-1102924430037 | NANCY J BUSHEY | 55418 | 479731 | 4983870 | 260 |
| 136 | 1918 | ASHINGTON ST N E 053-1102924430038 | ROBERT CLARENCE BATES ETAL | 55418 | 479731 | 4983887 | 260 |
| 137 | 1802 | ASHINGTON ST N E 053-1102924430040 | THOMAS L DANCICK | 55418 | 479731 | 4983719 | 260 |
| 138 | 1808 | ASHINGTON ST N E 053-1102924430041 | CLAUDIA CARSTENS SMITH | 55418 | 479731 | 4983732 | 260 |
| 139 | 1812 | ASHINGTON ST N E 053-1102924430042 | VINCENT J TOMCZYK | 55418 | 479731 | 4983748 | 260 |
| 140 | 1816 | ASHINGTON ST N E 053-1102924430043 | L N SANDELL ETAL | 55418 | 479731 | 4983765 | 261 |
| 141 | 1828 | JEFFERSON ST N E 053-1102924430049 | RIVER EAST DEVELOPMENT CORP | 55418 | 479900 | 4983793 | 261 |
| 142 | 1826 | MONROE ST N E 053-1102924430058 | SHIV NATH & MAYA TANDON | 55418 | 480104 | 4983792 | 257 |
| 143 | 1726 | JEFFERSON ST N E 053-1102924430064 | RHONDA M HARMON | 55413 | 479899 | 4983666 | 260 |
| 144 | 1724 | JEFFERSON ST N E 053-1102924430065 | TIMOTHY JON SPEIDEL | 55413 | 479899 | 4983657 | 259 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|------------|----------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP |
| 107 | 2208 MADISON ST N E | 0.00002541 | 834 | 0.00033198 | 0.00325116 | 0.00032505 | 18,660 | 0.00441045 | 0.04324287 | 19,493 |
| 108 | 2212 MADISON ST N E | 0.00002409 | 785 | 0.00031779 | 0.00309903 | 0.00030591 | 17,569 | 0.00423060 | 0.04135461 | 18,354 |
| 109 | 2218 MADISON ST N E | 0.00002310 | 754 | 0.00030822 | 0.00300036 | 0.00029370 | 16,878 | 0.00411279 | 0.04012701 | 17,632 |
| 110 | 2201 JEFFERSON ST N E | 0.00002244 | 733 | 0.00028974 | 0.00305283 | 0.00028776 | 16,390 | 0.00392799 | 0.04104507 | 17,123 |
| 111 | 2201 ASHINGTON ST N E | 0.00002871 | 804 | 0.00043164 | 0.00334719 | 0.00035970 | 17,984 | 0.00560571 | 0.04264095 | 18,789 |
| 112 | 2110 ASHINGTON ST N E | 0.00003663 | 920 | 0.00042702 | 0.00406329 | 0.00045573 | 20,505 | 0.00569184 | 0.05160573 | 21,424 |
| 113 | 646 22ND AVE N E | 0.00003498 | 985 | 0.00049401 | 0.00419826 | 0.00043890 | 22,000 | 0.00633633 | 0.05260332 | 22,985 |
| 114 | 666 22ND AVE N E | 0.00003531 | 1,142 | 0.00040755 | 0.00398937 | 0.00044616 | 25,461 | 0.00540342 | 0.05183508 | 26,602 |
| 115 | 636 22ND AVE N E | 0.00003630 | 966 | 0.00053790 | 0.00406560 | 0.00045573 | 21,538 | 0.00700755 | 0.05008047 | 22,504 |
| 116 | 2000 ASHINGTON ST N E | 0.00005709 | 1,358 | 0.00058179 | 0.00458832 | 0.00070356 | 30,233 | 0.00765435 | 0.05485425 | 31,591 |
| 117 | 613 20TH AVE N E | 0.00005181 | 1,232 | 0.00052734 | 0.00443124 | 0.00064152 | 27,403 | 0.00697323 | 0.05266965 | 28,635 |
| 118 | 2008 ASHINGTON ST N E | 0.00005346 | 1,284 | 0.00054384 | 0.00471933 | 0.00066099 | 28,613 | 0.00717915 | 0.05678739 | 29,897 |
| 119 | 2012 ASHINGTON ST N E | 0.00004917 | 1,183 | 0.00050358 | 0.00456423 | 0.00060786 | 26,364 | 0.00667689 | 0.05569575 | 27,547 |
| 120 | 2018 ASHINGTON ST N E | 0.00004620 | 1,120 | 0.00049665 | 0.00435600 | 0.00057189 | 24,984 | 0.00654390 | 0.05333130 | 26,104 |
| 121 | 2102 ASHINGTON ST N E | 0.00004323 | 1,060 | 0.00048840 | 0.00393921 | 0.00053658 | 23,621 | 0.00651024 | 0.04835292 | 24,681 |
| 122 | 2106 ASHINGTON ST N E | 0.00004059 | 1,004 | 0.00047421 | 0.00370854 | 0.00050523 | 22,390 | 0.00632643 | 0.04667817 | 23,394 |
| 123 | 655 20TH AVE N E | 0.00005973 | 1,595 | 0.00073590 | 0.00467016 | 0.00073161 | 35,490 | 0.00894498 | 0.05862648 | 37,085 |
| 124 | 2009 ASHINGTON ST N E | 0.00005874 | 1,459 | 0.00061644 | 0.00505131 | 0.00072039 | 32,464 | 0.00801339 | 0.05916306 | 33,923 |
| 125 | 2001 ASHINGTON ST N E | 0.00006402 | 1,573 | 0.00068376 | 0.00500709 | 0.00078474 | 35,010 | 0.00888162 | 0.05794569 | 36,583 |
| 126 | 1922 MONROE ST N E | 0.00008712 | 2,218 | 0.00123453 | 0.00483384 | 0.00098637 | 49,320 | 0.01419528 | 0.05543736 | 51,538 |
| 127 | 1922 JEFFERSON ST N E | 0.00009009 | 2,230 | 0.00082170 | 0.00527604 | 0.00108075 | 49,544 | 0.01025508 | 0.06071142 | 51,773 |
| 128 | 1928 JEFFERSON ST N E | 0.00008151 | 2,042 | 0.00083127 | 0.00508695 | 0.00098835 | 45,397 | 0.00997029 | 0.06116979 | 47,440 |
| 129 | 640 20TH AVE N E | 0.00007920 | 1,909 | 0.00083028 | 0.00473913 | 0.00096393 | 42,493 | 0.01044681 | 0.06016725 | 44,402 |
| 130 | 1927 ASHINGTON ST N E | 0.00007557 | 1,788 | 0.00073128 | 0.00529122 | 0.00092004 | 39,790 | 0.00917400 | 0.05863341 | 41,578 |
| 131 | 1923 ASHINGTON ST N E | 0.00008415 | 1,983 | 0.00079860 | 0.00541629 | 0.00102234 | 44,132 | 0.00998481 | 0.06281517 | 46,115 |
| 132 | 627 19TH AVE N E | 0.00009141 | 2,042 | 0.00086658 | 0.00551463 | 0.00108867 | 44,857 | 0.01074348 | 0.06868851 | 46,899 |
| 133 | 619 19TH AVE N E | 0.00008085 | 1,815 | 0.00083721 | 0.00512127 | 0.00096888 | 39,846 | 0.01079166 | 0.06700122 | 41,661 |
| 134 | 623 19TH AVE N E | 0.00008580 | 1,928 | 0.00084084 | 0.00523875 | 0.00102465 | 42,309 | 0.01062435 | 0.06748995 | 44,237 |
| 135 | 1912 ASHINGTON ST N E | 0.00007689 | 1,743 | 0.00071808 | 0.00504867 | 0.00092433 | 38,321 | 0.00947100 | 0.06448200 | 40,064 |
| 136 | 1918 ASHINGTON ST N E | 0.00007227 | 1,654 | 0.00067584 | 0.00486354 | 0.00087483 | 36,452 | 0.00887370 | 0.06153576 | 38,105 |
| 137 | 1802 ASHINGTON ST N E | 0.00004587 | 1,308 | 0.00087450 | 0.00611688 | 0.00056595 | 28,876 | 0.01003860 | 0.07227132 | 30,184 |
| 138 | 1808 ASHINGTON ST N E | 0.00005214 | 1,428 | 0.00094149 | 0.00646767 | 0.00063756 | 31,532 | 0.01067946 | 0.08194857 | 32,959 |
| 139 | 1812 ASHINGTON ST N E | 0.00006072 | 1,578 | 0.00099495 | 0.00755799 | 0.00073260 | 34,749 | 0.01095600 | 0.08890134 | 36,327 |
| 140 | 1816 ASHINGTON ST N E | 0.00006963 | 1,730 | 0.00099528 | 0.00796158 | 0.00083853 | 38,064 | 0.01135827 | 0.09126678 | 39,793 |
| 141 | 1828 JEFFERSON ST N E | 0.00025377 | 5,295 | 0.00209385 | 0.00864600 | 0.00283437 | 120,073 | 0.02409792 | 0.10790868 | 125,368 |
| 142 | 1826 MONROE ST N E | 0.00016566 | 3,680 | 0.00148764 | 0.00634722 | 0.00172458 | 84,221 | 0.01528395 | 0.07000950 | 87,902 |
| 143 | 1726 JEFFERSON ST N E | 0.00029271 | 4,228 | 0.00359700 | 0.01732236 | 0.00296802 | 99,576 | 0.04217367 | 0.13001142 | 103,804 |
| 144 | 1724 JEFFERSON ST N E | 0.00025542 | 4,148 | 0.00334719 | 0.01252020 | 0.00258555 | 96,895 | 0.03792426 | 0.13015563 | 101,044 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|-----------------------|-------------------|------------------------------|------------|----------------|----------------|----------------------|
| 145 | 1720 JEFFERSON ST N E | 053-1102924430066 | CHRISTINE SROKA | 55413 | 479899 | 4983649 | 259 |
| 146 | 1732 JEFFERSON ST N E | 053-1102924430067 | CARLA A SELLERS | 55413 | 479899 | 4983679 | 260 |
| 147 | 654 18TH AVE N E | 053-1102924430068 | PATRICK T GRIMM | 55418 | 479871 | 4983676 | 260 |
| 148 | 1724 JEFFERSON ST N E | 053-1102924430069 | TIMOTHY JON SPEIDEL | 55413 | 479871 | 4983655 | 259 |
| 149 | 1723 ADAMS ST N E | 053-1102924430070 | J S MINER & L J MINER | 55413 | 479836 | 4983666 | 259 |
| 150 | 1737 ADAMS ST N E | 053-1102924430071 | HENNEPIN FORFEITED LAND | 55413 | 479796 | 4983671 | 260 |
| 151 | 628 20TH AVE N E | 053-1102924430072 | MARY KOMPERDA | 55418 | 479750 | 4983912 | 260 |
| 152 | 624 20TH AVE N E | 053-1102924430073 | JENNY M LAPoint | 55418 | 479739 | 4983912 | 260 |
| 153 | 620 20TH AVE N E | 053-1102924430074 | ANNE MARIE THOM | 55418 | 479730 | 4983912 | 260 |
| 154 | 618 20TH AVE N E | 053-1102924430075 | DAVID J PSOTKA | 55418 | 479720 | 4983911 | 260 |
| 155 | 2101 ASHINGTON ST N E | 053-1102924430076 | ST JOHN'S EVAN LUTH CH MPLS | 55418 | 479832 | 4984014 | 261 |
| 156 | 2009 JEFFERSON ST N E | 053-1102924430077 | GREAT NORTHERN RAILWAY CO | 55418 | 479892 | 4983992 | 260 |
| 157 | 655 19TH AVE N E | 053-1102924430078 | PROP GRWTH XIV/JEFRSN OFFICE | 55418 | 479933 | 4983905 | 259 |
| 158 | 1918 JEFFERSON ST N E | 053-1102924430079 | ANN A HAAGENSEN | 55418 | 479853 | 4983889 | 259 |
| 159 | 1914 JEFFERSON ST N E | 053-1102924430080 | JOHN A BEERS & WIFE | 55418 | 479853 | 4983875 | 260 |
| 160 | 653 19TH AVE N E | 053-1102924430081 | SEC PACIFIC NATL BK TRUSTEE | 55418 | 479871 | 4983846 | 260 |
| 161 | 649 19TH AVE N E | 053-1102924430082 | KATHRYN FORSLIN | 55418 | 479858 | 4983846 | 260 |
| 162 | 645 19TH AVE N E | 053-1102924430083 | THOMAS HAJNASIEWICZ ET AL | 55418 | 479846 | 4983846 | 260 |
| 163 | 641 19TH AVE N E | 053-1102924430084 | PETER E FOOSHE JR | 55418 | 479834 | 4983846 | 260 |
| 164 | 639 19TH AVE N E | 053-1102924430085 | RJG LLC | 55418 | 479821 | 4983846 | 260 |
| 165 | 637 19TH AVE N E | 053-1102924430086 | GREATER MPLS METRO HSNG CORP | 55418 | 479809 | 4983846 | 260 |
| 166 | 635 19TH AVE N E | 053-1102924430087 | MARY KELLY KUNESH | 55418 | 479796 | 4983846 | 260 |
| 167 | 631 19TH AVE N E | 053-1102924430088 | MARGUERITE R HERRMANN | 55418 | 479783 | 4983846 | 260 |
| 168 | 1915 ASHINGTON ST N E | 053-1102924430089 | MAJ SIRI ULMEN | 55418 | 479801 | 4983875 | 260 |
| 169 | 1919 ASHINGTON ST N E | 053-1102924430090 | FRANK D KOSTRZEWSKI | 55418 | 479801 | 4983889 | 260 |
| 170 | 652 19TH AVE N E | 053-1102924430094 | STANLEY B KODET | 55418 | 479877 | 4983793 | 261 |
| 171 | 648 19TH AVE N E | 053-1102924430095 | MARK NELS PHIPPS | 55418 | 479859 | 4983792 | 261 |
| 172 | 646 19TH AVE N E | 053-1102924430096 | ROBERT BUSETH | 55418 | 479847 | 4983792 | 261 |
| 173 | 642 19TH AVE N E | 053-1102924430097 | ROSE M MANKOWSKI | 55418 | 479836 | 4983792 | 261 |
| 174 | 638 19TH AVE N E | 053-1102924430098 | JEANETTE M WINKELMANN | 55418 | 479819 | 4983792 | 261 |
| 175 | 636 19TH AVE N E | 053-1102924430099 | DONALD FRANCIS ZEMIEN | 55418 | 479807 | 4983792 | 261 |
| 176 | 634 19TH AVE N E | 053-1102924430100 | KEITH C BRASK | 55418 | 479794 | 4983792 | 261 |
| 177 | 630 19TH AVE N E | 053-1102924430101 | SUE FELEGY | 55418 | 479782 | 4983792 | 261 |
| 178 | 1803 JEFFERSON ST N E | 053-1102924430113 | CITY OF MPLS | 55418 | 479845 | 4983740 | 260 |
| 179 | 2030 MONROE ST N E | 053-1102924430115 | SP SCHOOL DIST NO 1 | 55418 | 480032 | 4983991 | 258 |
| 180 | 1912 MONROE ST N E | 053-1102924430118 | UNIVERSAL PLATING & RUST | 55418 | 480081 | 4983874 | 258 |
| 181 | 1900 MONROE ST N E | 053-1102924430119 | UNIVERSAL PLATING & RUST | 55418 | 480090 | 4983845 | 258 |
| 182 | 1720 MONROE ST N E | 053-1102924430120 | BURLINGTON NORTHERN RR CO | 55413 | 480085 | 4983666 | 256 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|--------------------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | |
| 145 | 1720 JEFFERSON ST N E | 0.00022935 | 4,065 | 0.00266772 | 0.01079199 | 0.00241428 | 94,838 | 0.03247992 | 0.13165977 98,903 |
| 146 | 1732 JEFFERSON ST N E | 0.00034353 | 4,596 | 0.00538065 | 0.02208558 | 0.00347391 | 109,609 | 0.04629834 | 0.16685823 114,205 |
| 147 | 654 18TH AVE N E | 0.00015972 | 3,282 | 0.00309210 | 0.01331616 | 0.00184272 | 75,480 | 0.03240501 | 0.14505810 78,762 |
| 148 | 1724 JEFFERSON ST N E | 0.00014520 | 3,090 | 0.00214665 | 0.01055835 | 0.00159522 | 69,973 | 0.02756556 | 0.12464100 73,063 |
| 149 | 1723 ADAMS ST N E | 0.00009075 | 2,326 | 0.00182292 | 0.00761442 | 0.00106656 | 51,692 | 0.02215950 | 0.09324447 54,018 |
| 150 | 1737 ADAMS ST N E | 0.00006072 | 1,718 | 0.00142395 | 0.00723261 | 0.00074019 | 37,864 | 0.01738737 | 0.09758793 39,581 |
| 151 | 628 20TH AVE N E | 0.00006996 | 1,624 | 0.00061710 | 0.00480777 | 0.00085239 | 36,030 | 0.00801933 | 0.06147735 37,654 |
| 152 | 624 20TH AVE N E | 0.00006732 | 1,565 | 0.00060390 | 0.00476916 | 0.00082269 | 34,670 | 0.00782661 | 0.06158691 36,234 |
| 153 | 620 20TH AVE N E | 0.00006567 | 1,518 | 0.00059961 | 0.00459756 | 0.00079893 | 33,607 | 0.00779955 | 0.05974056 35,125 |
| 154 | 618 20TH AVE N E | 0.00006369 | 1,470 | 0.00058740 | 0.00439164 | 0.00077418 | 32,500 | 0.00765831 | 0.05626566 33,969 |
| 155 | 2101 ASHINGTON ST N E | 0.00004653 | 1,243 | 0.00065208 | 0.00423621 | 0.00058080 | 27,716 | 0.00830577 | 0.05449653 28,959 |
| 156 | 2009 JEFFERSON ST N E | 0.00004884 | 1,429 | 0.00053625 | 0.00543246 | 0.00060753 | 31,852 | 0.00718542 | 0.06412989 33,281 |
| 157 | 655 19TH AVE N E | 0.00008316 | 2,420 | 0.00075834 | 0.00592680 | 0.00100683 | 53,739 | 0.01001517 | 0.07056555 56,159 |
| 158 | 1918 JEFFERSON ST N E | 0.00010032 | 2,440 | 0.00094446 | 0.00534072 | 0.00119427 | 54,236 | 0.01145364 | 0.05996166 56,676 |
| 159 | 1914 JEFFERSON ST N E | 0.00011220 | 2,660 | 0.00110319 | 0.00558624 | 0.00133848 | 59,244 | 0.01318053 | 0.06991413 61,904 |
| 160 | 653 19TH AVE N E | 0.00014388 | 3,320 | 0.00135960 | 0.00650859 | 0.00168168 | 74,139 | 0.01595847 | 0.08146215 77,460 |
| 161 | 649 19TH AVE N E | 0.00013959 | 3,192 | 0.00129888 | 0.00634689 | 0.00164010 | 71,234 | 0.01566774 | 0.07933530 74,427 |
| 162 | 645 19TH AVE N E | 0.00013431 | 3,047 | 0.00113883 | 0.00632610 | 0.00158499 | 67,940 | 0.01400487 | 0.07992864 70,987 |
| 163 | 641 19TH AVE N E | 0.00012870 | 2,900 | 0.00105831 | 0.00621357 | 0.00152229 | 64,536 | 0.01299243 | 0.07877826 67,436 |
| 164 | 639 19TH AVE N E | 0.00012309 | 2,754 | 0.00096855 | 0.00624492 | 0.00145563 | 61,152 | 0.01198824 | 0.07485456 63,906 |
| 165 | 637 19TH AVE N E | 0.00011715 | 2,616 | 0.00091245 | 0.00635118 | 0.00138930 | 57,941 | 0.01116159 | 0.07664085 60,557 |
| 166 | 635 19TH AVE N E | 0.00011154 | 2,478 | 0.00090090 | 0.00592383 | 0.00132099 | 54,769 | 0.01153614 | 0.07315044 57,247 |
| 167 | 631 19TH AVE N E | 0.00010560 | 2,347 | 0.00092796 | 0.00589545 | 0.00125400 | 51,747 | 0.01200573 | 0.07080777 54,095 |
| 168 | 1915 ASHINGTON ST N E | 0.00009735 | 2,236 | 0.00085107 | 0.00538626 | 0.00117216 | 49,641 | 0.01078242 | 0.06773943 51,876 |
| 169 | 1919 ASHINGTON ST N E | 0.00009108 | 2,111 | 0.00083094 | 0.00523578 | 0.00109857 | 46,934 | 0.01057683 | 0.06475326 49,045 |
| 170 | 652 19TH AVE N E | 0.00023067 | 4,744 | 0.00164967 | 0.00840840 | 0.00261129 | 106,698 | 0.02110878 | 0.10190532 111,442 |
| 171 | 648 19TH AVE N E | 0.00021186 | 4,315 | 0.00154341 | 0.00782595 | 0.00241032 | 96,323 | 0.01887963 | 0.10075230 100,638 |
| 172 | 646 19TH AVE N E | 0.00019899 | 4,039 | 0.00159885 | 0.00781473 | 0.00226974 | 89,734 | 0.02017191 | 0.09787833 93,773 |
| 173 | 642 19TH AVE N E | 0.00018546 | 3,777 | 0.00154209 | 0.00763884 | 0.00212751 | 83,600 | 0.01984554 | 0.09546768 87,376 |
| 174 | 638 19TH AVE N E | 0.00016698 | 3,437 | 0.00143088 | 0.00806751 | 0.00193050 | 75,856 | 0.01744215 | 0.10377609 79,293 |
| 175 | 636 19TH AVE N E | 0.00015246 | 3,178 | 0.00140778 | 0.00778074 | 0.00177507 | 69,995 | 0.01765896 | 0.10148721 73,173 |
| 176 | 634 19TH AVE N E | 0.00013860 | 2,934 | 0.00139524 | 0.00728475 | 0.00162459 | 64,564 | 0.01728375 | 0.09415725 67,498 |
| 177 | 630 19TH AVE N E | 0.00012507 | 2,694 | 0.00137082 | 0.00728904 | 0.00147411 | 59,208 | 0.01738143 | 0.08917491 61,902 |
| 178 | 1803 JEFFERSON ST N E | 0.00022407 | 4,354 | 0.00199056 | 0.00989835 | 0.00253143 | 97,574 | 0.02536050 | 0.12314808 101,928 |
| 179 | 2030 MONROE ST N E | 0.00005346 | 1,598 | 0.00070785 | 0.00478203 | 0.00065604 | 35,654 | 0.00862455 | 0.06045864 37,252 |
| 180 | 1912 MONROE ST N E | 0.00010593 | 2,663 | 0.00143781 | 0.00530904 | 0.00117546 | 59,370 | 0.01605483 | 0.05707779 62,034 |
| 181 | 1900 MONROE ST N E | 0.00012705 | 3,023 | 0.00152493 | 0.00580602 | 0.00137940 | 67,839 | 0.01681680 | 0.06347352 70,862 |
| 182 | 1720 MONROE ST N E | 0.00024651 | 5,761 | 0.00257895 | 0.01450515 | 0.00238293 | 137,652 | 0.02242284 | 0.09512217 143,412 |

| HOUSENO | STREET | PIN | NAME | ZIP | X_COORD | Y_COORD | ELEVATION (M) |
|---------|--------|------------------|--|-------|---------|---------|---------------|
| 183 | 661 | 19TH AVE N E | 053-1102924430121 UNIVERSAL PLATING & RUSTPRFG | 55418 | 480051 | 4983862 | 258 |
| 184 | 2012 | JEFFERSON ST N E | 053-1102924430122 BURLINGTON NORTHERN RR CO | 55418 | 479949 | 4983958 | 258 |
| 185 | 1800 | MONROE ST N E | 053-1102924430124 BURLINGTON NORTHERN RR CO | 55418 | 480058 | 4983758 | 258 |
| 186 | 1822 | MONROE ST N E | 053-1102924430128 ALFRED B & CHARLOTTE J BOLIN | 55418 | 480084 | 4983772 | 257 |
| 187 | 666 | 19TH AVE N E | 053-1102924430129 SHIV NATH & MAYA TANDON | 55418 | 480100 | 4983793 | 257 |
| 188 | 626 | 19TH AVE N E | 053-1102924430130 D G & L R BARTELL | 55418 | 479747 | 4983792 | 261 |
| 189 | 618 | 19TH AVE N E | 053-1102924430131 ROSS E TLEVA | 55418 | 479731 | 4983792 | 261 |
| 190 | 1815 | JEFFERSON ST N E | 053-1102924430132 ELECTRAMATIC INC | 55418 | 479952 | 4983758 | 261 |
| 191 | 677 | 18TH AVE N E | 053-1102924430133 ARNOLD GILBERTSON | 55418 | 479992 | 4983753 | 261 |
| 192 | 1719 | MADISON ST N E | 053-1102924430134 STEVEN G PARADISE | 55413 | 480051 | 4983673 | 257 |
| 193 | 1720 | MADISON ST N E | 053-1102924430135 MADISON COMPLEX INC | 55413 | 479978 | 4983669 | 260 |
| 194 | 1901 | JACKSON ST N E | 053-1102924440009 FARROWSA ISSAK | 55418 | 480414 | 4983878 | 258 |
| 195 | 1924 | QUINCY ST N E | 053-1102924440017 RAELENE J ROPER | 55418 | 480226 | 4983951 | 258 |
| 196 | 722 | 20TH AVE N E | 053-1102924440018 RICHARD J MACHOWICZ | 55418 | 480210 | 4983951 | 258 |
| 197 | 718 | 20TH AVE N E | 053-1102924440019 CLINT N KROHN | 55418 | 480194 | 4983951 | 258 |
| 198 | 710 | 20TH AVE N E | 053-1102924440020 DELORIS B WOODS | 55418 | 480179 | 4983951 | 258 |
| 199 | 1918 | QUINCY ST N E | 053-1102924440021 MARILYN B HEDENLAND | 55418 | 480209 | 4983931 | 258 |
| 200 | 1914 | QUINCY ST N E | 053-1102924440022 LEONARD C NELSON ETAL | 55418 | 480208 | 4983918 | 258 |
| 201 | 715 | 19TH AVE N E | 053-1102924440023 JOE ANN MATTHEWS | 55418 | 480189 | 4983892 | 257 |
| 202 | 1910 | QUINCY ST N E | 053-1102924440024 G HAKIZAMANA & N HAKIZAMANA | 55418 | 480214 | 4983905 | 258 |
| 203 | 1906 | QUINCY ST N E | 053-1102924440025 WASYL DAWYDENKO & WIFE | 55418 | 480214 | 4983892 | 257 |
| 204 | 1902 | QUINCY ST N E | 053-1102924440026 R A SCHWAAB & J F SCHWAAB | 55418 | 480214 | 4983879 | 257 |
| 205 | 703 | 19TH AVE N E | 053-1102924440027 M J OSMONSON & S OSMONSON | 55418 | 480146 | 4983886 | 258 |
| 206 | 707 | 19TH AVE N E | 053-1102924440028 BERNARD L SZYMCZAK ET AL | 55418 | 480165 | 4983885 | 258 |
| 207 | 713 | 19TH AVE N E | 053-1102924440029 GREGORY B KEISER | 55418 | 480178 | 4983885 | 258 |
| 208 | 1911 | MONROE ST N E | 053-1102924440030 G A WEITZEL & B WEITZEL | 55418 | 480159 | 4983905 | 258 |
| 209 | 1915 | MONROE ST N E | 053-1102924440031 JORGE A INAMAGUA | 55418 | 480159 | 4983918 | 258 |
| 210 | 1919 | MONROE ST N E | 053-1102924440032 SHAWN X YANG | 55418 | 480159 | 4983931 | 258 |
| 211 | 702 | 20TH AVE N E | 053-1102924440033 D W HICKCOX & K M HICKCOX | 55418 | 480140 | 4983951 | 258 |
| 212 | 706 | 20TH AVE N E | 053-1102924440034 MICHAEL A WICKANDER | 55418 | 480153 | 4983951 | 258 |
| 213 | 708 | 20TH AVE N E | 053-1102924440035 SHANE E KALUZA | 55418 | 480165 | 4983951 | 258 |
| 214 | 1854 | JACKSON ST N E | 053-1102924440036 SEC PACIFIC NATL BK TRUSTEE | 55418 | 480354 | 4983847 | 258 |
| 215 | 818 | 19TH AVE N E | 053-1102924440037 SPECIAL SCH DIST NO 1 | 55418 | 480325 | 4983841 | 258 |
| 216 | 1850 | JACKSON ST N E | 053-1102924440038 JOHN S SURMA SR | 55418 | 480355 | 4983834 | 258 |
| 217 | 1846 | JACKSON ST N E | 053-1102924440039 P & K JOHNSON | 55418 | 480344 | 4983821 | 258 |
| 218 | 1840 | JACKSON ST N E | 053-1102924440040 DOROTHY H ANDERSON | 55418 | 480344 | 4983808 | 258 |
| 219 | 1838 | JACKSON ST N E | 053-1102924440041 DALE KIPP | 55418 | 480344 | 4983795 | 258 |
| 220 | 1831 | QUINCY ST N E | 053-1102924440042 MARGUERITTE M SHOLES | 55418 | 480275 | 4983769 | 257 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|------------|---------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | | |
| 183 | 661 19TH AVE N E | 0.00012210 | 3,197 | 0.00136983 | 0.00639375 | 0.00135333 | 71,339 | 0.01305084 | 0.06791862 | 74,536 |
| 184 | 2012 JEFFERSON ST N E | 0.00005808 | 1,822 | 0.00056991 | 0.00498102 | 0.00071577 | 40,491 | 0.00769824 | 0.06082494 | 42,313 |
| 185 | 1800 MONROE ST N E | 0.00030294 | 6,438 | 0.00288882 | 0.01174569 | 0.00267498 | 153,074 | 0.02568852 | 0.07659102 | 159,512 |
| 186 | 1822 MONROE ST N E | 0.00021615 | 4,744 | 0.00190839 | 0.00829950 | 0.00210177 | 110,082 | 0.01864764 | 0.06887892 | 114,826 |
| 187 | 666 19TH AVE N E | 0.00016830 | 3,749 | 0.00153978 | 0.00652212 | 0.00173910 | 85,754 | 0.01615449 | 0.06983262 | 89,503 |
| 188 | 626 19TH AVE N E | 0.00009306 | 2,113 | 0.00112365 | 0.00632577 | 0.00110880 | 46,364 | 0.01485660 | 0.08000058 | 48,477 |
| 189 | 618 19TH AVE N E | 0.00008118 | 1,891 | 0.00096492 | 0.00602514 | 0.00097020 | 41,477 | 0.01292181 | 0.07486578 | 43,368 |
| 190 | 1815 JEFFERSON ST N E | 0.00045408 | 8,273 | 0.00352110 | 0.01199121 | 0.00445830 | 196,566 | 0.03878721 | 0.13946790 | 204,840 |
| 191 | 677 18TH AVE N E | 0.00048708 | 9,541 | 0.00418242 | 0.01303599 | 0.00482262 | 232,401 | 0.04824171 | 0.12073974 | 241,941 |
| 192 | 1719 MADISON ST N E | 0.00047982 | 9,851 | 0.00480447 | 0.03080154 | 0.00393426 | 254,586 | 0.03681909 | 0.11281875 | 264,437 |
| 193 | 1720 MADISON ST N E | 0.00148731 | 3,301 | 0.00765237 | 0.02806980 | 0.01479489 | 84,158 | 0.10885875 | 0.25243350 | 87,459 |
| 194 | 1901 JACKSON ST N E | 0.00002541 | 549 | 0.00046332 | 0.00357060 | 0.00032208 | 12,302 | 0.00639309 | 0.04622079 | 12,851 |
| 195 | 1924 QUINCY ST N E | 0.00004884 | 1,108 | 0.00061908 | 0.00474837 | 0.00058179 | 24,851 | 0.00733029 | 0.05429358 | 25,959 |
| 196 | 722 20TH AVE N E | 0.00005115 | 1,170 | 0.00065010 | 0.00454179 | 0.00060687 | 26,233 | 0.00737220 | 0.05444010 | 27,403 |
| 197 | 718 20TH AVE N E | 0.00005379 | 1,241 | 0.00065703 | 0.00466422 | 0.00063294 | 27,775 | 0.00830148 | 0.05342238 | 29,017 |
| 198 | 710 20TH AVE N E | 0.00005577 | 1,310 | 0.00072897 | 0.00439395 | 0.00065670 | 29,278 | 0.00929247 | 0.05351676 | 30,589 |
| 199 | 1918 QUINCY ST N E | 0.00005511 | 1,253 | 0.00068574 | 0.00493053 | 0.00065307 | 28,100 | 0.00801042 | 0.05680653 | 29,354 |
| 200 | 1914 QUINCY ST N E | 0.00005808 | 1,309 | 0.00070158 | 0.00490545 | 0.00068508 | 29,393 | 0.00829290 | 0.05853969 | 30,702 |
| 201 | 715 19TH AVE N E | 0.00006765 | 1,538 | 0.00076560 | 0.00480018 | 0.00078606 | 34,543 | 0.00903408 | 0.05890038 | 36,082 |
| 202 | 1910 QUINCY ST N E | 0.00005973 | 1,337 | 0.00070158 | 0.00474111 | 0.00070587 | 30,043 | 0.00825000 | 0.05594160 | 31,379 |
| 203 | 1906 QUINCY ST N E | 0.00006171 | 1,386 | 0.00067650 | 0.00447843 | 0.00072501 | 31,153 | 0.00810909 | 0.05513772 | 32,540 |
| 204 | 1902 QUINCY ST N E | 0.00006468 | 1,446 | 0.00068574 | 0.00477873 | 0.00076065 | 32,522 | 0.00820545 | 0.05799915 | 33,967 |
| 205 | 703 19TH AVE N E | 0.00008316 | 1,919 | 0.00097152 | 0.00533313 | 0.00094941 | 43,019 | 0.01184304 | 0.06222843 | 44,938 |
| 206 | 707 19TH AVE N E | 0.00007755 | 1,763 | 0.00090552 | 0.00534336 | 0.00089430 | 39,606 | 0.00989670 | 0.06328410 | 41,369 |
| 207 | 713 19TH AVE N E | 0.00007359 | 1,664 | 0.00085008 | 0.00531069 | 0.00085635 | 37,414 | 0.00983499 | 0.06448860 | 39,078 |
| 208 | 1911 MONROE ST N E | 0.00007227 | 1,674 | 0.00086757 | 0.00496683 | 0.00083556 | 37,493 | 0.01073952 | 0.05874858 | 39,167 |
| 209 | 1915 MONROE ST N E | 0.00006798 | 1,592 | 0.00085800 | 0.00478698 | 0.00078936 | 35,596 | 0.01075734 | 0.05765892 | 37,188 |
| 210 | 1919 MONROE ST N E | 0.00006402 | 1,512 | 0.00083259 | 0.00462033 | 0.00074580 | 33,791 | 0.01050819 | 0.05613465 | 35,303 |
| 211 | 702 20TH AVE N E | 0.00006105 | 1,498 | 0.00088341 | 0.00434412 | 0.00070983 | 33,341 | 0.01081212 | 0.05370057 | 34,839 |
| 212 | 706 20TH AVE N E | 0.00005940 | 1,435 | 0.00082764 | 0.00435237 | 0.00069399 | 31,981 | 0.01018149 | 0.05216178 | 33,416 |
| 213 | 708 20TH AVE N E | 0.00005775 | 1,373 | 0.00077220 | 0.00438603 | 0.00067650 | 30,637 | 0.00972609 | 0.05367285 | 32,010 |
| 214 | 1854 JACKSON ST N E | 0.00003333 | 716 | 0.00059202 | 0.00396957 | 0.00041745 | 16,109 | 0.00816816 | 0.05101536 | 16,826 |
| 215 | 818 19TH AVE N E | 0.00003861 | 828 | 0.00066297 | 0.00448668 | 0.00048345 | 18,638 | 0.00904365 | 0.05681280 | 19,466 |
| 216 | 1850 JACKSON ST N E | 0.00003267 | 713 | 0.00056595 | 0.00397947 | 0.00041184 | 16,034 | 0.00789888 | 0.05255019 | 16,747 |
| 217 | 1846 JACKSON ST N E | 0.00003399 | 746 | 0.00055902 | 0.00413226 | 0.00042768 | 16,781 | 0.00785664 | 0.05378901 | 17,527 |
| 218 | 1840 JACKSON ST N E | 0.00003333 | 740 | 0.00048873 | 0.00407682 | 0.00042009 | 16,654 | 0.00695640 | 0.05419656 | 17,394 |
| 219 | 1838 JACKSON ST N E | 0.00003300 | 738 | 0.00043296 | 0.00408177 | 0.00041283 | 16,577 | 0.00563079 | 0.05195157 | 17,314 |
| 220 | 1831 QUINCY ST N E | 0.00004686 | 1,056 | 0.00059103 | 0.00496221 | 0.00058047 | 23,758 | 0.00755601 | 0.06416091 | 24,814 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|----------------|---|------------|----------------|----------------|----------------------|
| 221 | 815 | 18 1/2 AVE N E | 053-1102924440043 A PLUS INVESTORS INC | 55418 | 480299 | 4983775 | 258 |
| 222 | 817 | 18 1/2 AVE N E | 053-1102924440044 MONICA S KOBESKA | 55418 | 480307 | 4983782 | 258 |
| 223 | 1835 | QUINCY ST N E | 053-1102924440045 A M KERR & K M KERR | 55418 | 480275 | 4983782 | 257 |
| 224 | 1837 | QUINCY ST N E | 053-1102924440046 LUCIA J WORTH | 55418 | 480278 | 4983795 | 257 |
| 225 | 1843 | QUINCY ST N E | 053-1102924440047 JOE C BUSCH | 55418 | 480286 | 4983808 | 258 |
| 226 | 1845 | QUINCY ST N E | 053-1102924440048 ANGEL O JARA & SARAH OVILLO | 55418 | 480286 | 4983821 | 258 |
| 227 | 808 | 19TH AVE N E | 053-1102924440049 MICHAEL E MAJSTERSKI | 55418 | 480283 | 4983841 | 257 |
| 228 | 800 | 19TH AVE N E | 053-1102924440050 DELORES M FARLEY | 55418 | 480263 | 4983841 | 257 |
| 229 | 816 | 19TH AVE N E | 053-1102924440051 DAVID J SCHOUWEILER JR | 55418 | 480301 | 4983841 | 258 |
| 230 | 804 | 19TH AVE N E | 053-1102924440052 KATHY HIETT MALLES | 55418 | 480273 | 4983841 | 257 |
| 231 | 918 | 18 1/2 AVE N E | 053-1102924440053 JUSTIN BRESHER | 55418 | 480463 | 4983730 | 259 |
| 232 | 917 | 18TH AVE N E | 053-1102924440061 RICHARD G LINDMAN ETAL | 55418 | 480423 | 4983659 | 259 |
| 233 | 1807 | JACKSON ST N E | 053-1102924440062 MITCHELL S BROD | 55418 | 480423 | 4983672 | 259 |
| 234 | 1811 | JACKSON ST N E | 053-1102924440063 ARNOLD M TABOR | 55418 | 480423 | 4983685 | 259 |
| 235 | 1813 | JACKSON ST N E | 053-1102924440064 TRISTA A JONK | 55418 | 480423 | 4983698 | 259 |
| 236 | 1819 | JACKSON ST N E | 053-1102924440065 DENNIS L HARRIS | 55418 | 480423 | 4983711 | 259 |
| 237 | 1823 | JACKSON ST N E | 053-1102924440066 KATHERINE V WALKER | 55418 | 480424 | 4983724 | 259 |
| 238 | 1825 | JACKSON ST N E | 053-1102924440067 FILOMENO PENA ET AL | 55418 | 480408 | 4983737 | 259 |
| 239 | 1824 | QUINCY ST N E | 053-1102924440070 DAVID L BIRT | 55418 | 480220 | 4983732 | 258 |
| 240 | 1816 | QUINCY ST N E | 053-1102924440073 WILLIAM M VOLNA & WIFE | 55418 | 480210 | 4983710 | 258 |
| 241 | 1812 | QUINCY ST N E | 053-1102924440074 WM M VOLNA & J C VOLNA | 55418 | 480207 | 4983698 | 257 |
| 242 | 1808 | QUINCY ST N E | 053-1102924440075 WILLIAM M VOLNA ETAL | 55418 | 480210 | 4983675 | 257 |
| 243 | 1801 | MONROE ST N E | 053-1102924440076 N P RY CO | 55418 | 480181 | 4983697 | 257 |
| 244 | 835 | 18 1/2 AVE N E | 053-1102924440078 W GREGORY & P T GREGORY | 55418 | 480368 | 4983773 | 258 |
| 245 | 833 | 18 1/2 AVE N E | 053-1102924440079 JEFFERY & HOLLY SCHRAM | 55418 | 480357 | 4983773 | 258 |
| 246 | 827 | 18 1/2 AVE N E | 053-1102924440080 WILLARD M SANDBERG ET AL | 55418 | 480346 | 4983773 | 258 |
| 247 | 823 | 18 1/2 AVE N E | 053-1102924440081 DARYLL INMAN | 55418 | 480335 | 4983773 | 258 |
| 248 | 819 | 18 1/2 AVE N E | 053-1102924440082 ARIAN KNOPS | 55418 | 480324 | 4983773 | 258 |
| 249 | 913 | 18 1/2 AVE N E | 053-1102924440083 JOHN S SURMA | 55418 | 480445 | 4983772 | 259 |
| 250 | 911 | 18 1/2 AVE N E | 053-1102924440084 JOHN S SURMA | 55418 | 480434 | 4983773 | 259 |
| 251 | 907 | 18 1/2 AVE N E | 053-1102924440085 CARL ZIMMERMAN | 55418 | 480423 | 4983773 | 259 |
| 252 | 905 | 18 1/2 AVE N E | 053-1102924440086 JOHN S SURMA | 55418 | 480413 | 4983773 | 258 |
| 253 | 901 | 18 1/2 AVE N E | 053-1102924440087 KARL F HERRMANN ETAL | 55418 | 480405 | 4983773 | 258 |
| 254 | 801 | 20TH AVE N E | 053-1102924440088 CITY OF MINNEAPOLIS | 55418 | 480265 | 4984004 | 257 |
| 255 | 805 | 20TH AVE N E | 053-1102924440089 CITY OF MINNEAPOLIS | 55418 | 480277 | 4984004 | 257 |
| 256 | 809 | 20TH AVE N E | 053-1102924440090 CITY OF MINNEAPOLIS | 55418 | 480290 | 4984004 | 257 |
| 257 | 815 | 20TH AVE N E | 053-1102924440091 CITY OF MINNEAPOLIS | 55418 | 480302 | 4984004 | 257 |
| 258 | 817 | 20TH AVE N E | 053-1102924440092 CITY OF MINNEAPOLIS | 55418 | 480313 | 4984004 | 257 |

| HOUSENO | STREET | POST-BAGHOUSE CASE | | | | PRE-BAGHOUSE CASE | | | | Total | |
|---------|--------|--------------------|------------|-----------|------------|-------------------|------------|-----------|------------|------------|--------|
| | | PER CONC | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | | |
| 221 | 815 | 18 1/2 AVE N E | 0.00004125 | 928 | 0.00052734 | 0.00474969 | 0.00051645 | 20,877 | 0.00670494 | 0.06005802 | 21,805 |
| 222 | 817 | 18 1/2 AVE N E | 0.00003960 | 890 | 0.00051018 | 0.00458964 | 0.00049698 | 20,002 | 0.00680361 | 0.05791500 | 20,892 |
| 223 | 1835 | QUINCY ST N E | 0.00004785 | 1,064 | 0.00067782 | 0.00501699 | 0.00059433 | 23,972 | 0.00958617 | 0.06435462 | 25,036 |
| 224 | 1837 | QUINCY ST N E | 0.00004785 | 1,054 | 0.00076098 | 0.00500940 | 0.00059532 | 23,752 | 0.01058607 | 0.06328179 | 24,806 |
| 225 | 1843 | QUINCY ST N E | 0.00004719 | 1,019 | 0.00079662 | 0.00501369 | 0.00058773 | 22,974 | 0.01097514 | 0.06368076 | 23,993 |
| 226 | 1845 | QUINCY ST N E | 0.00004785 | 1,023 | 0.00079563 | 0.00493086 | 0.00059466 | 23,081 | 0.01078077 | 0.06504069 | 24,104 |
| 227 | 808 | 19TH AVE N E | 0.00004884 | 1,053 | 0.00071181 | 0.00518463 | 0.00060588 | 23,762 | 0.00940698 | 0.06115065 | 24,815 |
| 228 | 800 | 19TH AVE N E | 0.00005511 | 1,186 | 0.00068838 | 0.00529683 | 0.00067584 | 26,780 | 0.00894300 | 0.06509481 | 27,965 |
| 229 | 816 | 19TH AVE N E | 0.00004455 | 948 | 0.00071016 | 0.00494340 | 0.00055374 | 21,384 | 0.00955548 | 0.06160836 | 22,332 |
| 230 | 804 | 19TH AVE N E | 0.00005181 | 1,113 | 0.00070686 | 0.00529254 | 0.00063888 | 25,150 | 0.00925716 | 0.06258318 | 26,263 |
| 231 | 918 | 18 1/2 AVE N E | 0.00001881 | 459 | 0.00029205 | 0.00317361 | 0.00024090 | 10,302 | 0.00377850 | 0.04214595 | 10,761 |
| 232 | 917 | 18TH AVE N E | 0.00002244 | 574 | 0.00033132 | 0.00363858 | 0.00028413 | 12,864 | 0.00445335 | 0.04791270 | 13,438 |
| 233 | 1807 | JACKSON ST N E | 0.00002211 | 563 | 0.00033891 | 0.00362934 | 0.00028215 | 12,617 | 0.00449427 | 0.04783449 | 13,180 |
| 234 | 1811 | JACKSON ST N E | 0.00002211 | 552 | 0.00036135 | 0.00339834 | 0.00028083 | 12,415 | 0.00478599 | 0.04508625 | 12,967 |
| 235 | 1813 | JACKSON ST N E | 0.00002211 | 545 | 0.00036927 | 0.00353760 | 0.00028050 | 12,260 | 0.00485463 | 0.04658181 | 12,805 |
| 236 | 1819 | JACKSON ST N E | 0.00002211 | 543 | 0.00035871 | 0.00352869 | 0.00028116 | 12,207 | 0.00466653 | 0.04631253 | 12,750 |
| 237 | 1823 | JACKSON ST N E | 0.00002211 | 535 | 0.00033396 | 0.00352374 | 0.00028017 | 12,009 | 0.00429198 | 0.04640922 | 12,543 |
| 238 | 1825 | JACKSON ST N E | 0.00002343 | 562 | 0.00034947 | 0.00362604 | 0.00029865 | 12,628 | 0.00458304 | 0.04730121 | 13,190 |
| 239 | 1824 | QUINCY ST N E | 0.00006600 | 1,495 | 0.00081378 | 0.00682605 | 0.00081015 | 33,775 | 0.00982839 | 0.08567724 | 35,269 |
| 240 | 1816 | QUINCY ST N E | 0.00006996 | 1,634 | 0.00097713 | 0.00578688 | 0.00085371 | 37,018 | 0.01226511 | 0.08080611 | 38,652 |
| 241 | 1812 | QUINCY ST N E | 0.00006897 | 1,676 | 0.00094842 | 0.00547173 | 0.00083457 | 37,955 | 0.01209021 | 0.06952572 | 39,631 |
| 242 | 1808 | QUINCY ST N E | 0.00006699 | 1,705 | 0.00078969 | 0.00512061 | 0.00080883 | 38,404 | 0.00979374 | 0.06207465 | 40,109 |
| 243 | 1801 | MONROE ST N E | 0.00008415 | 2,016 | 0.00113619 | 0.00604263 | 0.00100287 | 45,780 | 0.01422399 | 0.07655274 | 47,796 |
| 244 | 835 | 18 1/2 AVE N E | 0.00002871 | 659 | 0.00037554 | 0.00423456 | 0.00036003 | 14,787 | 0.00506385 | 0.05280693 | 15,446 |
| 245 | 833 | 18 1/2 AVE N E | 0.00003003 | 693 | 0.00039204 | 0.00419265 | 0.00037884 | 15,535 | 0.00525393 | 0.05368506 | 16,228 |
| 246 | 827 | 18 1/2 AVE N E | 0.00003168 | 726 | 0.00041118 | 0.00427812 | 0.00039864 | 16,282 | 0.00548988 | 0.05424705 | 17,007 |
| 247 | 823 | 18 1/2 AVE N E | 0.00003366 | 765 | 0.00043032 | 0.00432927 | 0.00042141 | 17,173 | 0.00566544 | 0.05476416 | 17,938 |
| 248 | 819 | 18 1/2 AVE N E | 0.00003564 | 811 | 0.00045870 | 0.00444939 | 0.00044781 | 18,232 | 0.00583011 | 0.05579772 | 19,043 |
| 249 | 913 | 18 1/2 AVE N E | 0.00002046 | 476 | 0.00031152 | 0.00411510 | 0.00026004 | 10,680 | 0.00400785 | 0.05232051 | 11,157 |
| 250 | 911 | 18 1/2 AVE N E | 0.00002145 | 499 | 0.00032109 | 0.00419958 | 0.00027258 | 11,189 | 0.00411444 | 0.05293530 | 11,688 |
| 251 | 907 | 18 1/2 AVE N E | 0.00002244 | 520 | 0.00033066 | 0.00427581 | 0.00028446 | 11,662 | 0.00422037 | 0.05336397 | 12,183 |
| 252 | 905 | 18 1/2 AVE N E | 0.00002343 | 543 | 0.00033693 | 0.00419826 | 0.00029469 | 12,167 | 0.00426789 | 0.05131005 | 12,710 |
| 253 | 901 | 18 1/2 AVE N E | 0.00002409 | 558 | 0.00033858 | 0.00423192 | 0.00030327 | 12,498 | 0.00436755 | 0.05124273 | 13,056 |
| 254 | 801 | 20TH AVE N E | 0.00003663 | 834 | 0.00048543 | 0.00407352 | 0.00043956 | 18,687 | 0.00578391 | 0.04877466 | 19,521 |
| 255 | 805 | 20TH AVE N E | 0.00003564 | 803 | 0.00047916 | 0.00404217 | 0.00042669 | 17,990 | 0.00574596 | 0.04936866 | 18,793 |
| 256 | 809 | 20TH AVE N E | 0.00003432 | 775 | 0.00047058 | 0.00390423 | 0.00041481 | 17,365 | 0.00569382 | 0.04782525 | 18,139 |
| 257 | 815 | 20TH AVE N E | 0.00003333 | 747 | 0.00045804 | 0.00382008 | 0.00040260 | 16,753 | 0.00559251 | 0.04761042 | 17,500 |
| 258 | 817 | 20TH AVE N E | 0.00003234 | 721 | 0.00044286 | 0.00361185 | 0.00039105 | 16,177 | 0.00544566 | 0.04571556 | 16,898 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|----------------|---|------------|----------------|----------------|----------------------|
| 259 | 700 | 22ND AVE N E | 053-1102924440094 BD OF EDUCATION | 55418 | 480184 | 4984029 | 258 |
| 260 | 823 | 20TH AVE N E | 053-1102924440097 J A & M L STCYR | 55418 | 480346 | 4983996 | 257 |
| 261 | 821 | 20TH AVE N E | 053-1102924440098 A H EL BAKRI/A H SUTHERLAND | 55418 | 480329 | 4984004 | 257 |
| 262 | 820 | 20TH AVE N E | 053-1102924440112 KELLY J ZIMMERSCHEID | 55418 | 480325 | 4983944 | 257 |
| 263 | 832 | 20TH AVE N E | 053-1102924440113 NANCY SABA | 55418 | 480367 | 4983953 | 258 |
| 264 | 1916 | JACKSON ST N E | 053-1102924440114 LAVINA A EICH | 55418 | 480367 | 4983933 | 258 |
| 265 | 826 | 20TH AVE N E | 053-1102924440116 DANIEL J BUSSE | 55418 | 480339 | 4983944 | 258 |
| 266 | 1914 | JACKSON ST N E | 053-1102924440118 SIDNEY J GREENBLAT | 55418 | 480346 | 4983918 | 258 |
| 267 | 1908 | JACKSON ST N E | 053-1102924440119 DANIEL R SCOGGINS | 55418 | 480353 | 4983905 | 258 |
| 268 | 1904 | JACKSON ST N E | 053-1102924440120 DARREN L ERICKSON | 55418 | 480360 | 4983892 | 258 |
| 269 | 1900 | JACKSON ST N E | 053-1102924440121 ELSIE M ROBERTSON | 55418 | 480360 | 4983878 | 258 |
| 270 | 819 | 19TH AVE N E | 053-1102924440122 PAUL E ERICKSON | 55418 | 480325 | 4983891 | 257 |
| 271 | 825 | 19TH AVE N E | 053-1102924440123 B A & V L WHITMORE | 55418 | 480338 | 4983885 | 258 |
| 272 | 809 | 19TH AVE N E | 053-1102924440124 CITY OF MINNEAPOLIS | 55418 | 480290 | 4983885 | 257 |
| 273 | 815 | 19TH AVE N E | 053-1102924440125 HENNEPIN FORFEITED LAND | 55418 | 480306 | 4983885 | 257 |
| 274 | 801 | 19TH AVE N E | 053-1102924440126 CITY OF MINNEAPOLIS | 55418 | 480263 | 4983885 | 257 |
| 275 | 807 | 19TH AVE N E | 053-1102924440127 CITY OF MINNEAPOLIS | 55418 | 480274 | 4983885 | 257 |
| 276 | 1911 | QUINCY ST N E | 053-1102924440128 CITY OF MINNEAPOLIS | 55418 | 480285 | 4983905 | 257 |
| 277 | 1915 | QUINCY ST N E | 053-1102924440129 CITY OF MINNEAPOLIS | 55418 | 480285 | 4983918 | 257 |
| 278 | 1919 | QUINCY ST N E | 053-1102924440130 CITY OF MINNEAPOLIS | 55418 | 480285 | 4983931 | 257 |
| 279 | 804 | 20TH AVE N E | 053-1102924440131 CITY OF MINNEAPOLIS | 55418 | 480266 | 4983951 | 258 |
| 280 | 806 | 20TH AVE N E | 053-1102924440132 CITY OF MINNEAPOLIS | 55418 | 480280 | 4983951 | 258 |
| 281 | 810 | 20TH AVE N E | 053-1102924440133 CITY OF MINNEAPOLIS | 55418 | 480293 | 4983951 | 257 |
| 282 | 814 | 20TH AVE N E | 053-1102924440134 CITY OF MINNEAPOLIS | 55418 | 480306 | 4983951 | 257 |
| 283 | 1852 | QUINCY ST N E | 053-1102924440135 JENNIFER L AMES | 55418 | 480221 | 4983848 | 257 |
| 284 | 714 | 19TH AVE N E | 053-1102924440136 THOMAS M TABOR | 55418 | 480192 | 4983841 | 257 |
| 285 | 718 | 19TH AVE N E | 053-1102924440137 R A JOHNSON & J NYABANDO | 55418 | 480204 | 4983841 | 257 |
| 286 | 1848 | QUINCY ST N E | 053-1102924440138 BERNARD R UBL ET AL | 55418 | 480221 | 4983835 | 257 |
| 287 | 1846 | QUINCY ST N E | 053-1102924440139 R B EHRLERT & A M EHRLERT | 55418 | 480209 | 4983822 | 257 |
| 288 | 1842 | QUINCY ST N E | 053-1102924440140 PAUL J BURSCH | 55418 | 480209 | 4983809 | 257 |
| 289 | 1838 | QUINCY ST N E | 053-1102924440141 WILLIAM P TYKWINSKI & WIFE | 55418 | 480209 | 4983796 | 257 |
| 290 | 1834 | QUINCY ST N E | 053-1102924440142 R & E SMITH | 55418 | 480217 | 4983782 | 257 |
| 291 | 1828 | QUINCY ST N E | 053-1102924440143 J M WILLMAN & V L BAKER | 55418 | 480217 | 4983769 | 257 |
| 292 | 715 | 18 1/2 AVE N E | 053-1102924440144 RICHARD E KOENING & WIFE | 55418 | 480194 | 4983776 | 257 |
| 293 | 1829 | MONROE ST N E | 053-1102924440145 MARY E ROSENQUIST | 55418 | 480157 | 4983769 | 257 |
| 294 | 1835 | MONROE ST N E | 053-1102924440146 VERNON R SCHMIDT & WIFE | 55418 | 480157 | 4983786 | 257 |
| 295 | 1833 | MONROE ST N E | 053-1102924440147 SHERMAN E ROBISON ETAL | 55418 | 480157 | 4983779 | 257 |
| 296 | 1839 | MONROE ST N E | 053-1102924440148 T P & K D REINKE | 55418 | 480157 | 4983796 | 257 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>POST-BAGHOUSE CASE</u> | | | | | <u>PRE-BAGHOUSE CASE</u> | | | | | <u>Total</u> |
|----------------|---------------|---------------------------|------------|-----------|------------|------------|--------------------------|-----------|------------|------------|--------|--------------|
| | | PER CONC | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP | | |
| 259 | 700 | 22ND AVE N E | 0.00004026 | 987 | 0.00061842 | 0.00339471 | 0.00048081 | 21,984 | 0.00783981 | 0.04386195 | 22,971 | |
| 260 | 823 | 20TH AVE N E | 0.00003003 | 666 | 0.00039204 | 0.00370458 | 0.00036828 | 14,957 | 0.00476487 | 0.04591026 | 15,623 | |
| 261 | 821 | 20TH AVE N E | 0.00003102 | 689 | 0.00041745 | 0.00360195 | 0.00037653 | 15,462 | 0.00519486 | 0.04387977 | 16,151 | |
| 262 | 820 | 20TH AVE N E | 0.00003597 | 786 | 0.00044352 | 0.00435732 | 0.00043890 | 17,670 | 0.00530046 | 0.05477109 | 18,456 | |
| 263 | 832 | 20TH AVE N E | 0.00003102 | 666 | 0.00040128 | 0.00420915 | 0.00038346 | 14,985 | 0.00500445 | 0.05493873 | 15,651 | |
| 264 | 1916 | JACKSON ST N E | 0.00003201 | 681 | 0.00040920 | 0.00387057 | 0.00039600 | 15,317 | 0.00523182 | 0.05126088 | 15,998 | |
| 265 | 826 | 20TH AVE N E | 0.00003465 | 748 | 0.00042900 | 0.00449955 | 0.00042570 | 16,836 | 0.00524502 | 0.05732133 | 17,584 | |
| 266 | 1914 | JACKSON ST N E | 0.00003498 | 751 | 0.00044649 | 0.00404844 | 0.00043560 | 16,899 | 0.00570405 | 0.05315838 | 17,650 | |
| 267 | 1908 | JACKSON ST N E | 0.00003465 | 734 | 0.00042240 | 0.00427581 | 0.00043032 | 16,539 | 0.00561627 | 0.05241489 | 17,273 | |
| 268 | 1904 | JACKSON ST N E | 0.00003366 | 712 | 0.00048906 | 0.00453354 | 0.00042009 | 16,042 | 0.00656337 | 0.05697780 | 16,754 | |
| 269 | 1900 | JACKSON ST N E | 0.00003333 | 708 | 0.00053460 | 0.00445929 | 0.00041811 | 15,953 | 0.00723294 | 0.05694810 | 16,661 | |
| 270 | 819 | 19TH AVE N E | 0.00003894 | 839 | 0.00047322 | 0.00426921 | 0.00048312 | 18,893 | 0.00610698 | 0.05150277 | 19,732 | |
| 271 | 825 | 19TH AVE N E | 0.00003696 | 789 | 0.00050292 | 0.00469623 | 0.00046299 | 17,778 | 0.00670296 | 0.05768565 | 18,567 | |
| 272 | 809 | 19TH AVE N E | 0.00004587 | 994 | 0.00057222 | 0.00468633 | 0.00056133 | 22,404 | 0.00712734 | 0.05805558 | 23,398 | |
| 273 | 815 | 19TH AVE N E | 0.00004257 | 921 | 0.00052470 | 0.00415998 | 0.00052602 | 20,744 | 0.00668349 | 0.05253666 | 21,665 | |
| 274 | 801 | 19TH AVE N E | 0.00005148 | 1,131 | 0.00060885 | 0.00520146 | 0.00062304 | 25,457 | 0.00735042 | 0.06053058 | 26,588 | |
| 275 | 807 | 19TH AVE N E | 0.00004917 | 1,070 | 0.00060324 | 0.00509355 | 0.00059631 | 24,110 | 0.00731412 | 0.06100710 | 25,181 | |
| 276 | 1911 | QUINCY ST N E | 0.00004521 | 991 | 0.00053526 | 0.00492822 | 0.00054879 | 22,281 | 0.00650331 | 0.05899707 | 23,272 | |
| 277 | 1915 | QUINCY ST N E | 0.00004389 | 966 | 0.00052668 | 0.00477114 | 0.00053097 | 21,725 | 0.00618948 | 0.05732133 | 22,690 | |
| 278 | 1919 | QUINCY ST N E | 0.00004257 | 940 | 0.00051678 | 0.00451704 | 0.00051216 | 21,095 | 0.00604395 | 0.05353854 | 22,035 | |
| 279 | 804 | 20TH AVE N E | 0.00004323 | 963 | 0.00055143 | 0.00412764 | 0.00052008 | 21,618 | 0.00664224 | 0.05030883 | 22,581 | |
| 280 | 806 | 20TH AVE N E | 0.00004125 | 917 | 0.00051447 | 0.00421377 | 0.00049962 | 20,602 | 0.00628386 | 0.04930728 | 21,519 | |
| 281 | 810 | 20TH AVE N E | 0.00003927 | 873 | 0.00047586 | 0.00413292 | 0.00047487 | 19,602 | 0.00570867 | 0.04846314 | 20,475 | |
| 282 | 814 | 20TH AVE N E | 0.00003762 | 835 | 0.00047256 | 0.00426030 | 0.00045771 | 18,735 | 0.00559812 | 0.05162619 | 19,570 | |
| 283 | 1852 | QUINCY ST N E | 0.00006864 | 1,499 | 0.00079827 | 0.00561297 | 0.00081609 | 33,852 | 0.00951258 | 0.06071769 | 35,351 | |
| 284 | 714 | 19TH AVE N E | 0.00008085 | 1,792 | 0.00084282 | 0.00558657 | 0.00094446 | 40,455 | 0.01057221 | 0.06191790 | 42,247 | |
| 285 | 718 | 19TH AVE N E | 0.00007623 | 1,675 | 0.00083820 | 0.00569316 | 0.00089793 | 37,846 | 0.01039434 | 0.06176841 | 39,521 | |
| 286 | 1848 | QUINCY ST N E | 0.00007062 | 1,534 | 0.00083853 | 0.00527538 | 0.00084645 | 34,690 | 0.01018842 | 0.06494499 | 36,223 | |
| 287 | 1846 | QUINCY ST N E | 0.00007755 | 1,679 | 0.00090156 | 0.00585750 | 0.00092631 | 38,024 | 0.01103916 | 0.07220895 | 39,703 | |
| 288 | 1842 | QUINCY ST N E | 0.00007887 | 1,693 | 0.00091806 | 0.00626109 | 0.00094677 | 38,402 | 0.01157343 | 0.07680816 | 40,095 | |
| 289 | 1838 | QUINCY ST N E | 0.00007887 | 1,688 | 0.00109461 | 0.00642906 | 0.00095271 | 38,295 | 0.01407879 | 0.07969401 | 39,983 | |
| 290 | 1834 | QUINCY ST N E | 0.00007326 | 1,576 | 0.00114906 | 0.00604263 | 0.00089133 | 35,684 | 0.01535589 | 0.07756485 | 37,260 | |
| 291 | 1828 | QUINCY ST N E | 0.00007161 | 1,562 | 0.00107877 | 0.00627066 | 0.00087681 | 35,367 | 0.01483350 | 0.07971117 | 36,929 | |
| 292 | 715 | 18 1/2 AVE N E | 0.00008745 | 1,866 | 0.00129228 | 0.00685872 | 0.00105171 | 42,370 | 0.01681779 | 0.08433678 | 44,236 | |
| 293 | 1829 | MONROE ST N E | 0.00012111 | 2,566 | 0.00146586 | 0.00796323 | 0.00141405 | 58,723 | 0.01782825 | 0.10074702 | 61,289 | |
| 294 | 1835 | MONROE ST N E | 0.00011913 | 2,555 | 0.00130119 | 0.00747912 | 0.00137346 | 58,388 | 0.01523115 | 0.09204657 | 60,944 | |
| 295 | 1833 | MONROE ST N E | 0.00012045 | 2,570 | 0.00127644 | 0.00772794 | 0.00139689 | 58,762 | 0.01548756 | 0.09800406 | 61,332 | |
| 296 | 1839 | MONROE ST N E | 0.00011616 | 2,515 | 0.00125730 | 0.00647922 | 0.00132825 | 57,337 | 0.01491765 | 0.07672764 | 59,852 | |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|----------------|---|------------|----------------|----------------|----------------------|
| 297 | 1843 | MONROE ST N E | 053-1102924440149 WENDY A WILLASCH | 55418 | 480157 | 4983809 | 257 |
| 298 | 1847 | MONROE ST N E | 053-1102924440150 SANFORD W BROUGHTON | 55418 | 480157 | 4983822 | 257 |
| 299 | 917 | 18 1/2 AVE N E | 053-1102924440159 BEVERLY INVESTMENT PROP INC | 55418 | 480463 | 4983774 | 259 |
| 300 | 911 | 18 1/2 AVE N E | 053-1102924440160 JOHN S SURMA | 55418 | 480439 | 4983794 | 259 |
| 301 | 907 | 18 1/2 AVE N E | 053-1102924440161 CARL ZIMMERMAN | 55418 | 480423 | 4983794 | 259 |
| 302 | 1839 | JACKSON ST N E | 053-1102924440162 THOMAS D FRYE & WIFE | 55418 | 480408 | 4983794 | 258 |
| 303 | 1843 | JACKSON ST N E | 053-1102924440163 JOHN S SURMA | 55418 | 480424 | 4983807 | 258 |
| 304 | 1847 | JACKSON ST N E | 053-1102924440164 JOHN S SURMA | 55418 | 480424 | 4983820 | 258 |
| 305 | 902 | 19TH AVE N E | 053-1102924440165 VICKI M BROUSSEAU | 55418 | 480403 | 4983840 | 258 |
| 306 | 904 | 19TH AVE N E | 053-1102924440166 SHERRY L DOUGHERTY | 55418 | 480413 | 4983840 | 258 |
| 307 | 908 | 19TH AVE N E | 053-1102924440167 S R CLAYTON & R W PERRIN | 55418 | 480423 | 4983840 | 258 |
| 308 | 910 | 19TH AVE N E | 053-1102924440168 MANUAL Y GONZALES | 55418 | 480434 | 4983840 | 258 |
| 309 | 914 | 19TH AVE N E | 053-1102924440169 M C D A | 55418 | 480445 | 4983840 | 258 |
| 310 | 1826 | JACKSON ST N E | 053-1102924440170 G GONZALEZ-MARTINEZ ET AL | 55418 | 480364 | 4983737 | 258 |
| 311 | 826 | 18 1/2 AVE N E | 053-1102924440171 KEITH DAVID REICH | 55418 | 480351 | 4983731 | 258 |
| 312 | 820 | 18 1/2 AVE N E | 053-1102924440172 FRED YARBROUGH | 55418 | 480324 | 4983731 | 258 |
| 313 | 824 | 18 1/2 AVE N E | 053-1102924440173 BILLY G FOX & BETTY FOX | 55418 | 480338 | 4983731 | 258 |
| 314 | 1822 | JACKSON ST N E | 053-1102924440174 FEDERAL HOME LOAN MTGE CORP | 55418 | 480363 | 4983724 | 258 |
| 315 | 1816 | JACKSON ST N E | 053-1102924440175 CURTIS EPPS | 55418 | 480345 | 4983711 | 258 |
| 316 | 1812 | JACKSON ST N E | 053-1102924440176 L & C KRAMER | 55418 | 480345 | 4983698 | 258 |
| 317 | 1810 | JACKSON ST N E | 053-1102924440177 DARLENE M PARKER | 55418 | 480345 | 4983685 | 258 |
| 318 | 823 | 18TH AVE N E | 053-1102924440178 NO STATES POWER CO | 55418 | 480331 | 4983666 | 258 |
| 319 | 825 | 18TH AVE N E | 053-1102924440179 M L & N BARTHOLD | 55418 | 480351 | 4983666 | 258 |
| 320 | 835 | 18TH AVE N E | 053-1102924440180 JULIE A PAQUETTE | 55418 | 480365 | 4983666 | 258 |
| 321 | 1803 | QUINCY ST N E | 053-1102924440181 M J & P J SEDERLUND | 55418 | 480283 | 4983660 | 258 |
| 322 | 1807 | QUINCY ST N E | 053-1102924440182 SCOTT E SCHMIDT | 55418 | 480283 | 4983673 | 258 |
| 323 | 1811 | QUINCY ST N E | 053-1102924440183 VAN THUY TRAN | 55418 | 480284 | 4983686 | 258 |
| 324 | 1815 | QUINCY ST N E | 053-1102924440184 FRANK W DOSSE | 55418 | 480284 | 4983699 | 258 |
| 325 | 1819 | QUINCY ST N E | 053-1102924440185 DONA M BRASHEAR | 55418 | 480284 | 4983712 | 258 |
| 326 | 816 | 18 1/2 AVE N E | 053-1102924440186 VICKEY J CASEY | 55418 | 480305 | 4983731 | 258 |
| 327 | 1823 | QUINCY ST N E | 053-1102924440187 R H & M A NOLLET | 55418 | 480269 | 4983731 | 258 |
| 328 | 812 | 18 1/2 AVE N E | 053-1102924440188 SEC OF VETERANS AFFAIRS | 55418 | 480290 | 4983731 | 258 |
| 329 | 828 | 20TH AVE N E | 053-1102924440191 CHERI ANN MILLS | 55418 | 480353 | 4983944 | 258 |
| 330 | 914 | 18 1/2 AVE N E | 053-1102924440195 HAROLD OJA | 55418 | 480435 | 4983737 | 259 |
| 331 | 714 | 18 1/2 AVE N E | 053-1102924440198 W & C WARREN | 55418 | 480171 | 4983721 | 257 |
| 332 | 1855 | MONROE ST N E | 053-1102924440199 DONALD E ANDERSON | 55418 | 480145 | 4983842 | 258 |
| 333 | 708 | 19TH AVE N E | 053-1102924440200 ERIC M SKOGLUND ET AL | 55418 | 480169 | 4983842 | 257 |
| 334 | 1701 | MONROE ST N E | 053-1402924110001 GREAT NORTHERN RY | 55413 | 480202 | 4983444 | 258 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | | |
|---------|--------|----------------|--------------------|-----------|------------|-------------------|------------|-----------|------------|------------|--------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | | | |
| 297 | 1843 | MONROE ST N E | 0.00011055 | 2,428 | 0.00112497 | 0.00597927 | 0.00125664 | 55,151 | 0.01388211 | 0.06738633 | 57,579 |
| 298 | 1847 | MONROE ST N E | 0.00010461 | 2,327 | 0.00101640 | 0.00583605 | 0.00118635 | 52,716 | 0.01213509 | 0.06527532 | 55,043 |
| 299 | 917 | 18 1/2 AVE N E | 0.00001914 | 448 | 0.00029403 | 0.00396429 | 0.00024387 | 10,039 | 0.00379731 | 0.05094342 | 10,486 |
| 300 | 911 | 18 1/2 AVE N E | 0.00002112 | 487 | 0.00030360 | 0.00375210 | 0.00026928 | 10,906 | 0.00414546 | 0.04608450 | 11,393 |
| 301 | 907 | 18 1/2 AVE N E | 0.00002277 | 518 | 0.00032043 | 0.00370524 | 0.00028743 | 11,597 | 0.00435039 | 0.04521594 | 12,115 |
| 302 | 1839 | JACKSON ST N E | 0.00002409 | 550 | 0.00033165 | 0.00350823 | 0.00030393 | 12,318 | 0.00446226 | 0.04528590 | 12,868 |
| 303 | 1843 | JACKSON ST N E | 0.00002244 | 513 | 0.00031449 | 0.00327393 | 0.00028545 | 11,476 | 0.00422301 | 0.04266405 | 11,989 |
| 304 | 1847 | JACKSON ST N E | 0.00002277 | 514 | 0.00031614 | 0.00323433 | 0.00028875 | 11,518 | 0.00413952 | 0.04240434 | 12,032 |
| 305 | 902 | 19TH AVE N E | 0.00002574 | 569 | 0.00041943 | 0.00345081 | 0.00032637 | 12,779 | 0.00592911 | 0.04598088 | 13,348 |
| 306 | 904 | 19TH AVE N E | 0.00002475 | 545 | 0.00038643 | 0.00333267 | 0.00031152 | 12,223 | 0.00547371 | 0.04471269 | 12,768 |
| 307 | 908 | 19TH AVE N E | 0.00002343 | 520 | 0.00035541 | 0.00319671 | 0.00029700 | 11,676 | 0.00505428 | 0.04316565 | 12,196 |
| 308 | 910 | 19TH AVE N E | 0.00002244 | 499 | 0.00033066 | 0.00307230 | 0.00028413 | 11,203 | 0.00466818 | 0.04136814 | 11,702 |
| 309 | 914 | 19TH AVE N E | 0.00002112 | 474 | 0.00031383 | 0.00298848 | 0.00026928 | 10,615 | 0.00416757 | 0.03949077 | 11,089 |
| 310 | 1826 | JACKSON ST N E | 0.00002838 | 675 | 0.00041976 | 0.00413490 | 0.00035706 | 15,157 | 0.00543378 | 0.05094276 | 15,832 |
| 311 | 826 | 18 1/2 AVE N E | 0.00003003 | 722 | 0.00044451 | 0.00402072 | 0.00037917 | 16,224 | 0.00577566 | 0.05022435 | 16,946 |
| 312 | 820 | 18 1/2 AVE N E | 0.00003432 | 816 | 0.00050127 | 0.00438867 | 0.00042999 | 18,335 | 0.00644556 | 0.05427576 | 19,151 |
| 313 | 824 | 18 1/2 AVE N E | 0.00003201 | 766 | 0.00046926 | 0.00416196 | 0.00040227 | 17,222 | 0.00607134 | 0.05198490 | 17,988 |
| 314 | 1822 | JACKSON ST N E | 0.00002838 | 685 | 0.00041019 | 0.00391281 | 0.00035739 | 15,420 | 0.00537702 | 0.05012535 | 16,106 |
| 315 | 1816 | JACKSON ST N E | 0.00003069 | 754 | 0.00044187 | 0.00422268 | 0.00038808 | 16,984 | 0.00587796 | 0.05378274 | 17,739 |
| 316 | 1812 | JACKSON ST N E | 0.00003069 | 764 | 0.00046992 | 0.00423819 | 0.00038775 | 17,171 | 0.00597861 | 0.05401440 | 17,934 |
| 317 | 1810 | JACKSON ST N E | 0.00003069 | 776 | 0.00047058 | 0.00403689 | 0.00038808 | 17,412 | 0.00607068 | 0.05163048 | 18,188 |
| 318 | 823 | 18TH AVE N E | 0.00003333 | 857 | 0.00044418 | 0.00442464 | 0.00041844 | 19,174 | 0.00572319 | 0.05614521 | 20,031 |
| 319 | 825 | 18TH AVE N E | 0.00003003 | 776 | 0.00040887 | 0.00420684 | 0.00037983 | 17,369 | 0.00529848 | 0.05409492 | 18,144 |
| 320 | 835 | 18TH AVE N E | 0.00002838 | 727 | 0.00038841 | 0.00406923 | 0.00035673 | 16,293 | 0.00505329 | 0.05266602 | 17,020 |
| 321 | 1803 | QUINCY ST N E | 0.00004323 | 1,119 | 0.00055374 | 0.00500478 | 0.00053856 | 25,043 | 0.00719301 | 0.06024051 | 26,162 |
| 322 | 1807 | QUINCY ST N E | 0.00004257 | 1,081 | 0.00057057 | 0.00492954 | 0.00052965 | 24,249 | 0.00721908 | 0.05834466 | 25,330 |
| 323 | 1811 | QUINCY ST N E | 0.00004224 | 1,062 | 0.00059961 | 0.00471372 | 0.00052833 | 23,877 | 0.00749232 | 0.05901423 | 24,939 |
| 324 | 1815 | QUINCY ST N E | 0.00004257 | 1,047 | 0.00058443 | 0.00494109 | 0.00052932 | 23,594 | 0.00778569 | 0.05972472 | 24,640 |
| 325 | 1819 | QUINCY ST N E | 0.00004257 | 1,029 | 0.00059928 | 0.00485826 | 0.00053031 | 23,176 | 0.00780021 | 0.05728899 | 24,205 |
| 326 | 816 | 18 1/2 AVE N E | 0.00003828 | 906 | 0.00056826 | 0.00468534 | 0.00047883 | 20,402 | 0.00728871 | 0.05687352 | 21,308 |
| 327 | 1823 | QUINCY ST N E | 0.00004719 | 1,104 | 0.00067221 | 0.00532488 | 0.00058773 | 24,853 | 0.00841764 | 0.06899145 | 25,957 |
| 328 | 812 | 18 1/2 AVE N E | 0.00004158 | 982 | 0.00061017 | 0.00488268 | 0.00052107 | 22,121 | 0.00775797 | 0.06197136 | 23,103 |
| 329 | 828 | 20TH AVE N E | 0.00003300 | 712 | 0.00042438 | 0.00437679 | 0.00040788 | 15,996 | 0.00526251 | 0.05665836 | 16,708 |
| 330 | 914 | 18 1/2 AVE N E | 0.00002112 | 508 | 0.00031350 | 0.00338877 | 0.00026895 | 11,431 | 0.00415140 | 0.04487670 | 11,939 |
| 331 | 714 | 18 1/2 AVE N E | 0.00009702 | 2,156 | 0.00114378 | 0.00808071 | 0.00115632 | 49,116 | 0.01363989 | 0.09709161 | 51,272 |
| 332 | 1855 | MONROE ST N E | 0.00010329 | 2,312 | 0.00108735 | 0.00598851 | 0.00116820 | 52,201 | 0.01226247 | 0.06829119 | 54,513 |
| 333 | 708 | 19TH AVE N E | 0.00009075 | 2,031 | 0.00088968 | 0.00548394 | 0.00103686 | 45,845 | 0.01084050 | 0.06048042 | 47,876 |
| 334 | 1701 | MONROE ST N E | 0.00006699 | 2,372 | 0.00057486 | 0.00420585 | 0.00086097 | 54,125 | 0.00754644 | 0.05106420 | 56,498 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|------------------|---|------------|----------------|----------------|----------------------|
| 335 | 1620 | CENTRAL AVE N E | 053-1402924110004 J G SANDER | 55413 | 480387 | 4983528 | 259 |
| 336 | 1500 | JACKSON ST N E | 053-1402924110005 SHAMROCK BUILDERS INC | 55413 | 480301 | 4983439 | 257 |
| 337 | 800 | 18TH AVE N E | 053-1402924110006 N P RY CO | 55418 | 480321 | 4983584 | 258 |
| 338 | 1607 | MONROE ST N E | 053-1402924110008 BURLINGTON-NORTHERN RR | 55413 | 480159 | 4983500 | 258 |
| 339 | 1427 | MONROE ST N E | 053-1402924110009 C E CAMERON & E A PRAML | 55413 | 480150 | 4983296 | 258 |
| 340 | 711 | 15TH AVE N E | 053-1402924110011 DURKEE ATWOOD COMPANY | 55413 | 480219 | 4983358 | 258 |
| 341 | 1431 | MONROE ST N E | 053-1402924110019 DIVERSIFIED SPECIALTIES INC | 55413 | 480150 | 4983309 | 258 |
| 342 | 1423 | MONROE ST N E | 053-1402924110020 L S & S J BERNSTEIN | 55413 | 480150 | 4983284 | 258 |
| 343 | 1417 | MONROE ST N E | 053-1402924110021 W J THOMPSON & D SKINNER | 55413 | 480150 | 4983271 | 258 |
| 344 | 1415 | MONROE ST N E | 053-1402924110022 RITA KUTA | 55413 | 480150 | 4983258 | 258 |
| 345 | 1411 | MONROE ST N E | 053-1402924110023 S R & R J SCALZO | 55413 | 480150 | 4983245 | 258 |
| 346 | 711 | 15TH AVE N E | 053-1402924110025 JONATHAN P WILKIE | 55413 | 480194 | 4983371 | 258 |
| 347 | 1503 | MONROE ST N E | 053-1402924110026 W P SPEAKE & L M SPEAKE | 55413 | 480150 | 4983341 | 258 |
| 348 | 1507 | MONROE ST N E | 053-1402924110027 MARK TERFEHR | 55413 | 480150 | 4983352 | 258 |
| 349 | 1511 | MONROE ST N E | 053-1402924110028 SAYER S FREY | 55413 | 480150 | 4983364 | 259 |
| 350 | 1515 | MONROE ST N E | 053-1402924110029 SEC OF VETERANS AFFAIRS | 55413 | 480150 | 4983376 | 259 |
| 351 | 1519 | MONROE ST N E | 053-1402924110030 WALTER E MCCABE & WIFE | 55413 | 480150 | 4983389 | 259 |
| 352 | 1523 | MONROE ST N E | 053-1402924110031 D A JENNER & H C JENNER | 55413 | 480150 | 4983401 | 259 |
| 353 | 712 | 15TH AVE N E | 053-1402924110034 DIVERSIFIED SPECIALTIES INC | 55413 | 480192 | 4983290 | 259 |
| 354 | 1400 | QUINCY ST N E | 053-1402924110041 JAMAL ZAIDI | 55413 | 480193 | 4983256 | 258 |
| 355 | 1529 | MONROE ST N E | 053-1402924110046 MICHELE J LANDON | 55413 | 480186 | 4983426 | 258 |
| 356 | 1531 | MONROE ST N E | 053-1402924110047 MICHELE J LANDON | 55413 | 480150 | 4983429 | 259 |
| 357 | 814 | 14TH AVE N E | 053-1402924110052 BURLINGTON-NORTHERN RR | 55413 | 480245 | 4983322 | 259 |
| 358 | 1403 | QUINCY ST N E | 053-1402924110053 JONATHAN P WILKIE | 55413 | 480249 | 4983291 | 259 |
| 359 | 1512 | CENTRAL AVE N E | 053-1402924110054 ANT LLC | 55413 | 480379 | 4983521 | 259 |
| 360 | 712 | 18TH AVE N E | 053-1402924110055 BN AND SF RW CO | 55418 | 480338 | 4983505 | 260 |
| 361 | 1724 | MONROE ST N E | 053-1402924120001 BURLINGTON-NORTHERN RR | 55413 | 480111 | 4983640 | 256 |
| 362 | 1700 | MONROE ST N E | 053-1402924120002 GT NOR RY CO | 55413 | 480103 | 4983607 | 257 |
| 363 | 1707 | JEFFERSON ST N E | 053-1402924120003 1707 JEFFERSON ST NE LLC | 55413 | 479971 | 4983615 | 259 |
| 364 | 1508 | MADISON ST N E | 053-1402924120004 JULIE A GUBBIN | 55413 | 479989 | 4983373 | 259 |
| 365 | 1502 | MADISON ST N E | 053-1402924120005 GARY DON PATCH | 55413 | 479989 | 4983360 | 259 |
| 366 | 1500 | MADISON ST N E | 053-1402924120006 BARBARA J PATCH | 55413 | 479999 | 4983346 | 259 |
| 367 | 671 | 15TH AVE N E | 053-1402924120007 JAMES T WILLIAMS | 55413 | 479978 | 4983346 | 259 |
| 368 | 1428 | MADISON ST N E | 053-1402924120008 SUSAN J MCCLOSKEY | 55413 | 479991 | 4983309 | 259 |
| 369 | 1424 | MADISON ST N E | 053-1402924120009 TARA L BRENNEMAN | 55413 | 479991 | 4983295 | 259 |
| 370 | 1431 | JEFFERSON ST N E | 053-1402924120010 S I BENOWITZ & J L BENOWITZ | 55413 | 479948 | 4983311 | 259 |
| 371 | 1425 | JEFFERSON ST N E | 053-1402924120011 BRENT R JACOBSON | 55413 | 479948 | 4983296 | 259 |
| 372 | 1501 | JEFFERSON ST N E | 053-1402924120012 D AHMED & E B HAROUN | 55413 | 479946 | 4983345 | 259 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|------------|----------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP |
| 335 | 1620 CENTRAL AVE N E | 0.00003498 | 959 | 0.00043527 | 0.00464013 | 0.00044220 | 21,338 | 0.00577896 | 0.05863473 | 22,297 |
| 336 | 1500 JACKSON ST N E | 0.00005181 | 1,682 | 0.00058410 | 0.00416625 | 0.00066330 | 38,048 | 0.00788832 | 0.04838922 | 39,730 |
| 337 | 800 18TH AVE N E | 0.00004422 | 1,176 | 0.00054813 | 0.00472791 | 0.00055011 | 26,092 | 0.00710985 | 0.06150045 | 27,269 |
| 338 | 1607 MONROE ST N E | 0.00010659 | 3,646 | 0.00088539 | 0.00479523 | 0.00135663 | 83,564 | 0.01137972 | 0.05730912 | 87,210 |
| 339 | 1427 MONROE ST N E | 0.00002739 | 1,009 | 0.00044814 | 0.00325182 | 0.00035310 | 22,784 | 0.00614394 | 0.04294917 | 23,792 |
| 340 | 711 15TH AVE N E | 0.00003795 | 1,426 | 0.00038346 | 0.00356895 | 0.00048675 | 32,335 | 0.00494043 | 0.04577001 | 33,761 |
| 341 | 1431 MONROE ST N E | 0.00002904 | 1,074 | 0.00044451 | 0.00318252 | 0.00037488 | 24,267 | 0.00607233 | 0.04338708 | 25,341 |
| 342 | 1423 MONROE ST N E | 0.00002607 | 956 | 0.00044979 | 0.00332937 | 0.00033561 | 21,594 | 0.00615846 | 0.04389396 | 22,550 |
| 343 | 1417 MONROE ST N E | 0.00002475 | 905 | 0.00044550 | 0.00334092 | 0.00031845 | 20,426 | 0.00612051 | 0.04427016 | 21,331 |
| 344 | 1415 MONROE ST N E | 0.00002343 | 859 | 0.00043890 | 0.00331419 | 0.00030261 | 19,368 | 0.00604527 | 0.04409922 | 20,227 |
| 345 | 1411 MONROE ST N E | 0.00002244 | 817 | 0.00042999 | 0.00325314 | 0.00028842 | 18,426 | 0.00593043 | 0.04343295 | 19,243 |
| 346 | 711 15TH AVE N E | 0.00004026 | 1,519 | 0.00039336 | 0.00374913 | 0.00051777 | 34,474 | 0.00522555 | 0.04706295 | 35,993 |
| 347 | 1503 MONROE ST N E | 0.00003399 | 1,258 | 0.00041349 | 0.00336072 | 0.00043626 | 28,453 | 0.00558558 | 0.04529019 | 29,711 |
| 348 | 1507 MONROE ST N E | 0.00003564 | 1,332 | 0.00039468 | 0.00333597 | 0.00046134 | 30,136 | 0.00530211 | 0.04455726 | 31,467 |
| 349 | 1511 MONROE ST N E | 0.00003861 | 1,427 | 0.00042075 | 0.00363528 | 0.00049632 | 32,322 | 0.00516087 | 0.04665606 | 33,748 |
| 350 | 1515 MONROE ST N E | 0.00004125 | 1,538 | 0.00044979 | 0.00372207 | 0.00053394 | 34,876 | 0.00548361 | 0.04806846 | 36,414 |
| 351 | 1519 MONROE ST N E | 0.00004488 | 1,662 | 0.00047850 | 0.00370854 | 0.00057651 | 37,725 | 0.00579876 | 0.04805460 | 39,387 |
| 352 | 1523 MONROE ST N E | 0.00004818 | 1,790 | 0.00050424 | 0.00378906 | 0.00062106 | 40,679 | 0.00607233 | 0.04989897 | 42,469 |
| 353 | 712 15TH AVE N E | 0.00002607 | 986 | 0.00030690 | 0.00309045 | 0.00033759 | 22,281 | 0.00380457 | 0.03965478 | 23,267 |
| 354 | 1400 QUINCY ST N E | 0.00002244 | 845 | 0.00029304 | 0.00265188 | 0.00028974 | 19,063 | 0.00402567 | 0.03422793 | 19,908 |
| 355 | 1529 MONROE ST N E | 0.00005841 | 2,141 | 0.00052239 | 0.00429957 | 0.00074910 | 48,777 | 0.00687819 | 0.05357286 | 50,918 |
| 356 | 1531 MONROE ST N E | 0.00005940 | 2,189 | 0.00055473 | 0.00453981 | 0.00076296 | 49,868 | 0.00738606 | 0.05521461 | 52,058 |
| 357 | 814 14TH AVE N E | 0.00003135 | 1,186 | 0.00033726 | 0.00330891 | 0.00040491 | 26,880 | 0.00422763 | 0.04346859 | 28,066 |
| 358 | 1403 QUINCY ST N E | 0.00002673 | 1,017 | 0.00028809 | 0.00308517 | 0.00034386 | 23,021 | 0.00368940 | 0.04059726 | 24,038 |
| 359 | 1512 CENTRAL AVE N E | 0.00003696 | 1,023 | 0.00049962 | 0.00479061 | 0.00046827 | 22,825 | 0.00666435 | 0.06119817 | 23,848 |
| 360 | 712 18TH AVE N E | 0.00004620 | 1,321 | 0.00074910 | 0.00443256 | 0.00058938 | 29,567 | 0.01017489 | 0.06061440 | 30,888 |
| 361 | 1724 MONROE ST N E | 0.00022011 | 5,101 | 0.00242385 | 0.01049169 | 0.00238161 | 115,866 | 0.02604756 | 0.10397640 | 120,967 |
| 362 | 1700 MONROE ST N E | 0.00028182 | 7,405 | 0.00240735 | 0.00924066 | 0.00324786 | 170,456 | 0.02683395 | 0.11742819 | 177,861 |
| 363 | 1707 JEFFERSON ST N E | 0.00032076 | 9,569 | 0.00370788 | 0.01326633 | 0.00314589 | 237,935 | 0.04127739 | 0.10957485 | 247,504 |
| 364 | 1508 MADISON ST N E | 0.00005313 | 1,595 | 0.00072006 | 0.00456984 | 0.00067518 | 36,054 | 0.00951489 | 0.05750811 | 37,649 |
| 365 | 1502 MADISON ST N E | 0.00004950 | 1,493 | 0.00067386 | 0.00444939 | 0.00063030 | 33,715 | 0.00893343 | 0.05545815 | 35,209 |
| 366 | 1500 MADISON ST N E | 0.00004587 | 1,399 | 0.00060984 | 0.00433125 | 0.00058344 | 31,587 | 0.00796818 | 0.05453679 | 32,986 |
| 367 | 671 15TH AVE N E | 0.00004521 | 1,358 | 0.00066132 | 0.00450384 | 0.00057651 | 30,587 | 0.00917235 | 0.05804271 | 31,945 |
| 368 | 1428 MADISON ST N E | 0.00003795 | 1,161 | 0.00051810 | 0.00396693 | 0.00048609 | 26,140 | 0.00692703 | 0.05097477 | 27,301 |
| 369 | 1424 MADISON ST N E | 0.00003564 | 1,088 | 0.00048378 | 0.00383328 | 0.00045441 | 24,479 | 0.00647196 | 0.04960857 | 25,567 |
| 370 | 1431 JEFFERSON ST N E | 0.00003531 | 1,051 | 0.00057321 | 0.00432696 | 0.00044748 | 23,598 | 0.00797610 | 0.05735367 | 24,649 |
| 371 | 1425 JEFFERSON ST N E | 0.00003300 | 988 | 0.00054087 | 0.00411972 | 0.00042009 | 22,172 | 0.00753720 | 0.05489583 | 23,160 |
| 372 | 1501 JEFFERSON ST N E | 0.00004092 | 1,208 | 0.00065340 | 0.00482526 | 0.00051711 | 27,142 | 0.00906411 | 0.06327849 | 28,350 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|-----------------------|-------------------|-----------------------------|------------|----------------|----------------|----------------------|
| 373 | 1505 JEFFERSON ST N E | 053-1402924120013 | MICHAEL PASLAWSKI | 55413 | 479946 | 4983358 | 259 |
| 374 | 1509 JEFFERSON ST N E | 053-1402924120014 | VICTOR Y SHURAN ET AL | 55413 | 479946 | 4983372 | 259 |
| 375 | 1626 MONROE ST N E | 053-1402924120017 | T E OPDAHL & L F OPDAHL | 55413 | 480093 | 4983542 | 257 |
| 376 | 1622 MONROE ST N E | 053-1402924120018 | D B & J L NOVAK | 55413 | 480093 | 4983528 | 258 |
| 377 | 1616 MONROE ST N E | 053-1402924120019 | COLIN E CARPENTER | 55413 | 480093 | 4983514 | 258 |
| 378 | 1612 MONROE ST N E | 053-1402924120020 | J H ITMAN TRUSTEE | 55413 | 480093 | 4983501 | 258 |
| 379 | 1610 MONROE ST N E | 053-1402924120021 | RUTH A MEYERS | 55413 | 480093 | 4983487 | 258 |
| 380 | 1606 MONROE ST N E | 053-1402924120022 | D A LARSON & K L LARSON | 55413 | 480093 | 4983473 | 258 |
| 381 | 1607 MADISON ST N E | 053-1402924120023 | BARBARA ROSE DALY | 55413 | 480050 | 4983473 | 257 |
| 382 | 1611 MADISON ST N E | 053-1402924120024 | DOLORES C GERKEN | 55413 | 480050 | 4983486 | 257 |
| 383 | 1615 MADISON ST N E | 053-1402924120025 | LORI BETH YEAGER | 55413 | 480050 | 4983499 | 257 |
| 384 | 1617 MADISON ST N E | 053-1402924120026 | SANDRA K SAMPLE | 55413 | 480050 | 4983512 | 257 |
| 385 | 1623 MADISON ST N E | 053-1402924120027 | JOSEPH T LAZARZ | 55413 | 480050 | 4983525 | 257 |
| 386 | 1627 MADISON ST N E | 053-1402924120028 | L N & S J ROTHE | 55413 | 480050 | 4983538 | 257 |
| 387 | 1600 MADISON ST N E | 053-1402924120032 | R E SLAIGHT | 55413 | 479991 | 4983459 | 258 |
| 388 | 1534 MADISON ST N E | 053-1402924120033 | K J RUIDL & K L RUIDL | 55413 | 479991 | 4983445 | 259 |
| 389 | 1530 MADISON ST N E | 053-1402924120034 | SUSAN CAMPION | 55413 | 479991 | 4983433 | 259 |
| 390 | 1526 MADISON ST N E | 053-1402924120035 | MPLS PUBLIC HSG AUTH | 55413 | 479991 | 4983421 | 259 |
| 391 | 1522 MADISON ST N E | 053-1402924120036 | PATRICIA FLYNN | 55413 | 479991 | 4983409 | 259 |
| 392 | 1518 MADISON ST N E | 053-1402924120037 | TIMOTHY D LEES | 55413 | 479991 | 4983396 | 259 |
| 393 | 1514 MADISON ST N E | 053-1402924120038 | CATHERINE B BABCOCK | 55413 | 479989 | 4983385 | 259 |
| 394 | 1515 JEFFERSON ST N E | 053-1402924120039 | B C CEREPAK & K D CEREPAK | 55413 | 479948 | 4983386 | 259 |
| 395 | 1507 JEFFERSON ST N E | 053-1402924120040 | CITY OF MPLS | 55413 | 479947 | 4983380 | 259 |
| 396 | 1519 JEFFERSON ST N E | 053-1402924120041 | ARTHUR & MARIE DULAC | 55413 | 479948 | 4983397 | 259 |
| 397 | 1523 JEFFERSON ST N E | 053-1402924120042 | G A FLOWER & S FLOWER | 55413 | 479948 | 4983408 | 259 |
| 398 | 1527 JEFFERSON ST N E | 053-1402924120043 | THERESA A SMITH | 55413 | 479948 | 4983422 | 259 |
| 399 | 1531 JEFFERSON ST N E | 053-1402924120044 | JEFFREY M UNDERWOOD | 55413 | 479948 | 4983434 | 259 |
| 400 | 1535 JEFFERSON ST N E | 053-1402924120045 | C SMITH & L K SMITH | 55413 | 479948 | 4983445 | 259 |
| 401 | 1541 JEFFERSON ST N E | 053-1402924120046 | C D BLOMBERG & B R JACOBSON | 55413 | 479948 | 4983459 | 258 |
| 402 | 1626 MADISON ST N E | 053-1402924120047 | ROBERT L GORMAN ETAL | 55413 | 479991 | 4983541 | 258 |
| 403 | 1622 MADISON ST N E | 053-1402924120048 | CYNTHIA K HENRIKSON | 55413 | 479991 | 4983527 | 258 |
| 404 | 1618 MADISON ST N E | 053-1402924120049 | HEIDI JO KNUTSON | 55413 | 479991 | 4983513 | 258 |
| 405 | 1614 MADISON ST N E | 053-1402924120050 | PETER J STASICA ETAL | 55413 | 479991 | 4983500 | 258 |
| 406 | 1610 MADISON ST N E | 053-1402924120051 | JOHN R RINGDAL ETAL | 55413 | 479991 | 4983487 | 258 |
| 407 | 1606 MADISON ST N E | 053-1402924120052 | A E & J A SEVIOLA | 55413 | 479991 | 4983473 | 258 |
| 408 | 1603 JEFFERSON ST N E | 053-1402924120053 | FRANCES T GRYGAR | 55413 | 479949 | 4983473 | 258 |
| 409 | 1607 JEFFERSON ST N E | 053-1402924120054 | ETHELDA SEAMAN | 55413 | 479949 | 4983486 | 258 |
| 410 | 1611 JEFFERSON ST N E | 053-1402924120055 | DAWN L PREMO | 55413 | 479949 | 4983500 | 258 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | 1HR CONC | 36-89DEP | Total |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|------------|----------|-------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | | | |
| 373 | 1505 JEFFERSON ST N E | 0.00004356 | 1,285 | 0.00069201 | 0.00505131 | 0.00055143 | 28,888 | 0.00958089 | 0.06578583 | 30,174 | |
| 374 | 1509 JEFFERSON ST N E | 0.00004653 | 1,364 | 0.00073161 | 0.00527505 | 0.00058806 | 30,686 | 0.01012341 | 0.06811200 | 32,050 | |
| 375 | 1626 MONROE ST N E | 0.00016137 | 5,677 | 0.00116358 | 0.00478104 | 0.00198957 | 131,700 | 0.01434576 | 0.06980919 | 137,377 | |
| 376 | 1622 MONROE ST N E | 0.00013926 | 4,874 | 0.00112431 | 0.00505659 | 0.00174339 | 112,569 | 0.01435071 | 0.06395169 | 117,443 | |
| 377 | 1616 MONROE ST N E | 0.00012045 | 4,251 | 0.00098670 | 0.00505131 | 0.00151404 | 97,733 | 0.01286934 | 0.06152190 | 101,983 | |
| 378 | 1612 MONROE ST N E | 0.00010428 | 3,702 | 0.00088704 | 0.00474276 | 0.00131637 | 84,748 | 0.01102596 | 0.05637159 | 88,450 | |
| 379 | 1610 MONROE ST N E | 0.00009207 | 3,267 | 0.00080850 | 0.00476124 | 0.00116292 | 74,547 | 0.00948552 | 0.05370948 | 77,814 | |
| 380 | 1606 MONROE ST N E | 0.00008184 | 2,907 | 0.00072831 | 0.00500016 | 0.00103752 | 66,231 | 0.00878889 | 0.06118101 | 69,138 | |
| 381 | 1607 MADISON ST N E | 0.00008646 | 2,880 | 0.00109791 | 0.00615120 | 0.00108504 | 65,417 | 0.01402038 | 0.07643229 | 68,297 | |
| 382 | 1611 MADISON ST N E | 0.00009570 | 3,190 | 0.00116226 | 0.00623832 | 0.00119757 | 72,559 | 0.01453122 | 0.07774734 | 75,749 | |
| 383 | 1615 MADISON ST N E | 0.00010560 | 3,520 | 0.00120483 | 0.00610401 | 0.00131472 | 80,192 | 0.01464441 | 0.08071206 | 83,712 | |
| 384 | 1617 MADISON ST N E | 0.00011715 | 3,912 | 0.00124146 | 0.00618849 | 0.00144936 | 89,322 | 0.01494042 | 0.08243862 | 93,234 | |
| 385 | 1623 MADISON ST N E | 0.00013233 | 4,437 | 0.00132000 | 0.00631851 | 0.00162129 | 101,734 | 0.01626108 | 0.08188455 | 106,172 | |
| 386 | 1627 MADISON ST N E | 0.00014883 | 5,050 | 0.00135993 | 0.00647295 | 0.00180675 | 116,384 | 0.01688742 | 0.08348241 | 121,435 | |
| 387 | 1600 MADISON ST N E | 0.00009273 | 2,728 | 0.00117414 | 0.00551430 | 0.00116325 | 62,132 | 0.01482558 | 0.07211820 | 64,860 | |
| 388 | 1534 MADISON ST N E | 0.00008514 | 2,491 | 0.00109659 | 0.00556578 | 0.00107547 | 56,685 | 0.01399728 | 0.07354908 | 59,177 | |
| 389 | 1530 MADISON ST N E | 0.00007821 | 2,298 | 0.00101376 | 0.00536217 | 0.00098736 | 52,183 | 0.01297032 | 0.07030551 | 54,480 | |
| 390 | 1526 MADISON ST N E | 0.00007161 | 2,123 | 0.00093720 | 0.00515097 | 0.00090816 | 48,173 | 0.01205094 | 0.06700782 | 50,296 | |
| 391 | 1522 MADISON ST N E | 0.00006600 | 1,969 | 0.00086889 | 0.00494373 | 0.00083820 | 44,598 | 0.01124178 | 0.06401571 | 46,566 | |
| 392 | 1518 MADISON ST N E | 0.00006138 | 1,833 | 0.00080982 | 0.00481635 | 0.00077847 | 41,507 | 0.01053162 | 0.06195750 | 43,340 | |
| 393 | 1514 MADISON ST N E | 0.00005709 | 1,705 | 0.00076857 | 0.00468336 | 0.00072336 | 38,557 | 0.01012308 | 0.05951946 | 40,261 | |
| 394 | 1515 JEFFERSON ST N E | 0.00005049 | 1,480 | 0.00079002 | 0.00550935 | 0.00063954 | 33,314 | 0.01090254 | 0.07050120 | 34,794 | |
| 395 | 1507 JEFFERSON ST N E | 0.00004851 | 1,422 | 0.00075999 | 0.00541101 | 0.00061446 | 32,007 | 0.01050588 | 0.06946137 | 33,429 | |
| 396 | 1519 JEFFERSON ST N E | 0.00005346 | 1,560 | 0.00082830 | 0.00568656 | 0.00067683 | 35,123 | 0.01142592 | 0.07208355 | 36,683 | |
| 397 | 1523 JEFFERSON ST N E | 0.00005709 | 1,653 | 0.00087186 | 0.00585420 | 0.00071940 | 37,218 | 0.01200408 | 0.07336131 | 38,871 | |
| 398 | 1527 JEFFERSON ST N E | 0.00006171 | 1,772 | 0.00092796 | 0.00601491 | 0.00077550 | 39,954 | 0.01273998 | 0.07417542 | 41,727 | |
| 399 | 1531 JEFFERSON ST N E | 0.00006633 | 1,895 | 0.00098208 | 0.00612051 | 0.00083292 | 42,728 | 0.01344288 | 0.07412493 | 44,623 | |
| 400 | 1535 JEFFERSON ST N E | 0.00007062 | 2,004 | 0.00105336 | 0.00616044 | 0.00088605 | 45,221 | 0.01406922 | 0.07481034 | 47,225 | |
| 401 | 1541 JEFFERSON ST N E | 0.00007557 | 2,144 | 0.00114840 | 0.00577368 | 0.00093885 | 48,362 | 0.01495296 | 0.07318872 | 50,506 | |
| 402 | 1626 MADISON ST N E | 0.00018942 | 5,321 | 0.00217767 | 0.00659769 | 0.00227931 | 124,037 | 0.02598420 | 0.08339133 | 129,358 | |
| 403 | 1622 MADISON ST N E | 0.00016401 | 4,638 | 0.00192984 | 0.00646074 | 0.00199947 | 107,326 | 0.02338083 | 0.08113809 | 111,964 | |
| 404 | 1618 MADISON ST N E | 0.00014520 | 4,137 | 0.00174141 | 0.00636867 | 0.00178497 | 95,272 | 0.02133417 | 0.08011641 | 99,408 | |
| 405 | 1614 MADISON ST N E | 0.00012870 | 3,696 | 0.00157113 | 0.00621390 | 0.00159192 | 84,801 | 0.01943172 | 0.07830603 | 88,497 | |
| 406 | 1610 MADISON ST N E | 0.00011484 | 3,324 | 0.00142362 | 0.00600765 | 0.00142725 | 76,032 | 0.01773816 | 0.07624914 | 79,356 | |
| 407 | 1606 MADISON ST N E | 0.00010296 | 3,003 | 0.00128799 | 0.00576873 | 0.00128502 | 68,512 | 0.01616736 | 0.07446153 | 71,515 | |
| 408 | 1603 JEFFERSON ST N E | 0.00008250 | 2,320 | 0.00130317 | 0.00580668 | 0.00102168 | 52,347 | 0.01691481 | 0.08051472 | 54,667 | |
| 409 | 1607 JEFFERSON ST N E | 0.00008943 | 2,488 | 0.00145464 | 0.00626967 | 0.00110187 | 56,157 | 0.01877007 | 0.08607093 | 58,644 | |
| 410 | 1611 JEFFERSON ST N E | 0.00009735 | 2,683 | 0.00161502 | 0.00663168 | 0.00119361 | 60,576 | 0.02064942 | 0.08961744 | 63,259 | |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X_COORD</u> | <u>Y_COORD</u> | <u>ELEVATION (M)</u> |
|----------------|-----------------------|-------------------|------------------------------|------------|----------------|----------------|----------------------|
| 411 | 1615 JEFFERSON ST N E | 053-1402924120056 | MARGARET J HANSEN | 55413 | 479949 | 4983513 | 258 |
| 412 | 1619 JEFFERSON ST N E | 053-1402924120057 | P TEP & P PEN | 55413 | 479949 | 4983526 | 258 |
| 413 | 1623 JEFFERSON ST N E | 053-1402924120058 | MARGARETTE M MAHONEY | 55413 | 479949 | 4983541 | 258 |
| 414 | 1718 JEFFERSON ST N E | 053-1402924120059 | ELIZABETH TAFT | 55413 | 479893 | 4983641 | 259 |
| 415 | 1716 JEFFERSON ST N E | 053-1402924120060 | LLOYD L SECREST | 55413 | 479893 | 4983630 | 259 |
| 416 | 1710 JEFFERSON ST N E | 053-1402924120061 | RICHARD A HARMON | 55413 | 479892 | 4983619 | 259 |
| 417 | 1708 JEFFERSON ST N E | 053-1402924120062 | LOUISE ANN PAULSON | 55413 | 479892 | 4983610 | 259 |
| 418 | 653 17TH AVE N E | 053-1402924120063 | R J LARSON & S A DERAUF | 55413 | 479892 | 4983591 | 259 |
| 419 | 1711 ADAMS ST N E | 053-1402924120066 | M M ANDERSON & C A GRIFFITH | 55413 | 479849 | 4983609 | 259 |
| 420 | 1715 ADAMS ST N E | 053-1402924120067 | BANKERS TRUST CO CALIF TRSTE | 55413 | 479849 | 4983621 | 259 |
| 421 | 1719 ADAMS ST N E | 053-1402924120068 | NEDAL Y ABUL-HAJJ | 55413 | 479849 | 4983636 | 259 |
| 422 | 1717 ASHINGTON ST N E | 053-1402924120069 | MPLS PUBLIC HOUSING AUTH | 55413 | 479770 | 4983626 | 259 |
| 423 | 630 17TH AVE N E | 053-1402924120070 | RAYMOND W HALL | 55413 | 479791 | 4983552 | 259 |
| 424 | 1630 ADAMS ST N E | 053-1402924120071 | GEORGE E KACZOR ETAL | 55413 | 479791 | 4983538 | 259 |
| 425 | 1626 ADAMS ST N E | 053-1402924120072 | W D VANCLEAVE & C J BURTNES | 55413 | 479791 | 4983526 | 259 |
| 426 | 1622 ADAMS ST N E | 053-1402924120073 | S A BOGGIE & B A SWEET | 55413 | 479791 | 4983514 | 259 |
| 427 | 1618 ADAMS ST N E | 053-1402924120074 | EUGENE R LETOURNEAU ETAL | 55413 | 479791 | 4983499 | 259 |
| 428 | 1610 ADAMS ST N E | 053-1402924120075 | MARY T SOLTYS | 55413 | 479791 | 4983481 | 259 |
| 429 | 1606 ADAMS ST N E | 053-1402924120076 | MARY T SOLTYS | 55413 | 479791 | 4983465 | 259 |
| 430 | 1602 ADAMS ST N E | 053-1402924120077 | DONNA L NORBERG | 55413 | 479791 | 4983453 | 259 |
| 431 | 1534 ADAMS ST N E | 053-1402924120078 | CHESTER J CISEK ETAL | 55413 | 479791 | 4983441 | 259 |
| 432 | 1530 ADAMS ST N E | 053-1402924120079 | PATRICIA A PETTIT | 55413 | 479791 | 4983430 | 259 |
| 433 | 1526 ADAMS ST N E | 053-1402924120080 | BARBARA D FRAZEE | 55413 | 479791 | 4983418 | 259 |
| 434 | 1520 ADAMS ST N E | 053-1402924120081 | JULIA KACHEROSKI | 55413 | 479791 | 4983402 | 258 |
| 435 | 1516 ADAMS ST N E | 053-1402924120082 | K F & S R NGAIMA | 55413 | 479791 | 4983390 | 258 |
| 436 | 1514 ADAMS ST N E | 053-1402924120083 | WA & K L OFTELIE | 55413 | 479791 | 4983379 | 258 |
| 437 | 1510 ADAMS ST N E | 053-1402924120084 | JANE A WEST | 55413 | 479791 | 4983367 | 258 |
| 438 | 1506 ADAMS ST N E | 053-1402924120085 | PATRICIA A STEINKE | 55413 | 479791 | 4983355 | 258 |
| 439 | 1500 ADAMS ST N E | 053-1402924120086 | M M RUFF & B A RUFF | 55413 | 479791 | 4983343 | 258 |
| 440 | 1503 ASHINGTON ST N E | 053-1402924120087 | WALTER J STETZ | 55413 | 479747 | 4983344 | 258 |
| 441 | 1507 ASHINGTON ST N E | 053-1402924120088 | A G HOFFMANN & B J HOFFMANN | 55413 | 479747 | 4983359 | 258 |
| 442 | 1513 ASHINGTON ST N E | 053-1402924120089 | D E & D B MARSKE | 55413 | 479747 | 4983377 | 259 |
| 443 | 1519 ASHINGTON ST N E | 053-1402924120090 | ROBERT VELST ET AL | 55413 | 479747 | 4983392 | 259 |
| 444 | 1523 ASHINGTON ST N E | 053-1402924120091 | BOLESLAW KUSMIDER ETAL | 55413 | 479747 | 4983404 | 259 |
| 445 | 1525 ASHINGTON ST N E | 053-1402924120092 | A M DALY & F J AMORE | 55413 | 479747 | 4983418 | 259 |
| 446 | 1535 ASHINGTON ST N E | 053-1402924120093 | S W BRAGG & M E BRAGG | 55413 | 479747 | 4983436 | 259 |
| 447 | 1539 ASHINGTON ST N E | 053-1402924120094 | PAULA M SKOCHINSKI | 55413 | 479747 | 4983453 | 259 |
| 448 | 1603 ASHINGTON ST N E | 053-1402924120095 | R & J A PATNODE | 55413 | 479747 | 4983469 | 259 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | |
|---------|-----------------------|------------|--------------------|------------|-------------|-------------------|----------|------------|------------|----------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP |
| 411 | 1615 JEFFERSON ST N E | 0.00010593 | 2,880 | 0.00176253 | 0.00693693 | 0.00128700 | 65,083 | 0.02223606 | 0.09085230 | 67,962 |
| 412 | 1619 JEFFERSON ST N E | 0.00011517 | 3,102 | 0.00189321 | 0.00693990 | 0.00138963 | 70,191 | 0.02336433 | 0.08795853 | 73,293 |
| 413 | 1623 JEFFERSON ST N E | 0.00012639 | 3,364 | 0.00199188 | 0.00645216 | 0.00150513 | 76,321 | 0.02367915 | 0.07721010 | 79,685 |
| 414 | 1718 JEFFERSON ST N E | 0.00019074 | 3,679 | 0.00239250 | 0.01112991 | 0.00208923 | 85,114 | 0.02852421 | 0.13083213 | 88,793 |
| 415 | 1716 JEFFERSON ST N E | 0.00017754 | 3,528 | 0.00232848 | 0.01054383 | 0.00200442 | 81,570 | 0.02915583 | 0.13203828 | 85,098 |
| 416 | 1710 JEFFERSON ST N E | 0.00016962 | 3,424 | 0.00243078 | 0.01058871 | 0.00195228 | 79,196 | 0.03121899 | 0.13649757 | 82,620 |
| 417 | 1708 JEFFERSON ST N E | 0.00015972 | 3,290 | 0.00232914 | 0.01041678 | 0.00186978 | 76,141 | 0.03090054 | 0.13739088 | 79,430 |
| 418 | 653 17TH AVE N E | 0.00013827 | 2,959 | 0.00189717 | 0.00689119 | 0.00166155 | 68,668 | 0.02586408 | 0.12415128 | 71,628 |
| 419 | 1711 ADAMS ST N E | 0.00009735 | 2,330 | 0.00152328 | 0.00850245 | 0.00114972 | 52,417 | 0.01912581 | 0.11223300 | 54,746 |
| 420 | 1715 ADAMS ST N E | 0.00009966 | 2,394 | 0.00143715 | 0.00929907 | 0.00116160 | 53,545 | 0.01757316 | 0.11509047 | 55,939 |
| 421 | 1719 ADAMS ST N E | 0.00010329 | 2,492 | 0.00135960 | 0.00890109 | 0.00118668 | 55,509 | 0.01714812 | 0.11390478 | 58,002 |
| 422 | 1717 ASHINGTON ST N E | 0.00004653 | 1,361 | 0.00068310 | 0.00620499 | 0.00055968 | 29,728 | 0.00954525 | 0.08012004 | 31,089 |
| 423 | 630 17TH AVE N E | 0.00005016 | 1,317 | 0.00079794 | 0.00645150 | 0.00062337 | 29,587 | 0.01050753 | 0.08425230 | 30,905 |
| 424 | 1630 ADAMS ST N E | 0.00004818 | 1,246 | 0.00070455 | 0.00630762 | 0.00060291 | 28,173 | 0.00940533 | 0.07867431 | 29,420 |
| 425 | 1626 ADAMS ST N E | 0.00004587 | 1,183 | 0.00069234 | 0.00555258 | 0.00058113 | 26,871 | 0.00946275 | 0.07488789 | 28,054 |
| 426 | 1622 ADAMS ST N E | 0.00004356 | 1,111 | 0.00068211 | 0.005556809 | 0.00055308 | 25,289 | 0.00882354 | 0.07754604 | 26,399 |
| 427 | 1618 ADAMS ST N E | 0.00004026 | 1,023 | 0.00078507 | 0.00562650 | 0.00051480 | 23,360 | 0.01024485 | 0.07524693 | 24,383 |
| 428 | 1610 ADAMS ST N E | 0.00003630 | 927 | 0.00077484 | 0.00563244 | 0.00046728 | 21,188 | 0.01053459 | 0.06987783 | 22,115 |
| 429 | 1606 ADAMS ST N E | 0.00003300 | 851 | 0.00068013 | 0.00538659 | 0.00042702 | 19,457 | 0.00946242 | 0.06963033 | 20,308 |
| 430 | 1602 ADAMS ST N E | 0.00003036 | 794 | 0.00056859 | 0.00476487 | 0.00039567 | 18,135 | 0.00806883 | 0.06512583 | 18,928 |
| 431 | 1534 ADAMS ST N E | 0.00002838 | 745 | 0.00051909 | 0.00499224 | 0.00036795 | 16,994 | 0.00700425 | 0.05824467 | 17,739 |
| 432 | 1530 ADAMS ST N E | 0.00002673 | 708 | 0.00050457 | 0.00518001 | 0.00034617 | 16,103 | 0.00677655 | 0.05912676 | 16,811 |
| 433 | 1526 ADAMS ST N E | 0.00002475 | 666 | 0.00047619 | 0.00514338 | 0.00032241 | 15,127 | 0.00646536 | 0.05986596 | 15,794 |
| 434 | 1520 ADAMS ST N E | 0.00002277 | 623 | 0.00042768 | 0.00456654 | 0.00029502 | 14,102 | 0.00584727 | 0.05601783 | 14,724 |
| 435 | 1516 ADAMS ST N E | 0.00002145 | 595 | 0.00039930 | 0.00413523 | 0.00027852 | 13,442 | 0.00542223 | 0.05405763 | 14,037 |
| 436 | 1514 ADAMS ST N E | 0.00002046 | 571 | 0.00037851 | 0.00413160 | 0.00026532 | 12,906 | 0.00511929 | 0.05273796 | 13,477 |
| 437 | 1510 ADAMS ST N E | 0.00001947 | 549 | 0.00037092 | 0.00405405 | 0.00025212 | 12,385 | 0.00501732 | 0.05261289 | 12,934 |
| 438 | 1506 ADAMS ST N E | 0.00001848 | 529 | 0.00037785 | 0.00385473 | 0.00024024 | 11,900 | 0.00504636 | 0.05074113 | 12,428 |
| 439 | 1500 ADAMS ST N E | 0.00001782 | 511 | 0.00039402 | 0.00358050 | 0.00022968 | 11,482 | 0.00501732 | 0.04766916 | 11,993 |
| 440 | 1503 ASHINGTON ST N E | 0.00001584 | 442 | 0.00032670 | 0.00410916 | 0.00020724 | 10,011 | 0.00453057 | 0.05211492 | 10,453 |
| 441 | 1507 ASHINGTON ST N E | 0.00001683 | 466 | 0.00035475 | 0.00441309 | 0.00022077 | 10,573 | 0.00488961 | 0.05476812 | 11,039 |
| 442 | 1513 ASHINGTON ST N E | 0.00001848 | 501 | 0.00038742 | 0.00468864 | 0.00024189 | 11,403 | 0.00530145 | 0.05700090 | 11,904 |
| 443 | 1519 ASHINGTON ST N E | 0.00001980 | 535 | 0.00040293 | 0.00449757 | 0.00026004 | 12,169 | 0.00546744 | 0.05285016 | 12,704 |
| 444 | 1523 ASHINGTON ST N E | 0.00002112 | 562 | 0.00040953 | 0.00416394 | 0.00027555 | 12,826 | 0.00583935 | 0.05265579 | 13,388 |
| 445 | 1525 ASHINGTON ST N E | 0.00002277 | 600 | 0.00049005 | 0.00442332 | 0.00029601 | 13,708 | 0.00690690 | 0.05925150 | 14,307 |
| 446 | 1535 ASHINGTON ST N E | 0.00002508 | 658 | 0.00058014 | 0.00478005 | 0.00032604 | 15,034 | 0.00798303 | 0.06207432 | 15,692 |
| 447 | 1539 ASHINGTON ST N E | 0.00002739 | 713 | 0.00061017 | 0.00475068 | 0.00035244 | 16,260 | 0.00818730 | 0.06158889 | 16,973 |
| 448 | 1603 ASHINGTON ST N E | 0.00002937 | 765 | 0.00058080 | 0.00473781 | 0.00037554 | 17,420 | 0.00755799 | 0.06176148 | 18,185 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|------------------------------------|------------------------------|------------|----------------|----------------|----------------------|
| 449 | 1611 | ASHINGTON ST N E053-1402924120096 | BRANDON T SIGRIST | 55413 | 479747 | 4983487 | 259 |
| 450 | 1619 | ASHINGTON ST N E053-1402924120097 | DONALD R LETOURNEAU | 55413 | 479747 | 4983508 | 259 |
| 451 | 1621 | ASHINGTON ST N E053-1402924120098 | M P BUTTERFIELD ETAL W/L EST | 55413 | 479747 | 4983526 | 259 |
| 452 | 1626 | JEFFERSON ST N E 053-1402924120101 | JOHN M HILDRETH | 55413 | 479905 | 4983552 | 259 |
| 453 | 650 | 17TH AVE N E 053-1402924120102 | P A LLAPA & M L LLAPA | 55413 | 479885 | 4983552 | 259 |
| 454 | 1622 | JEFFERSON ST N E 053-1402924120103 | BARBARA A JOHNSTON | 55413 | 479892 | 4983538 | 258 |
| 455 | 1618 | JEFFERSON ST N E 053-1402924120104 | R M ANGELES & R J ANGELES | 55413 | 479892 | 4983526 | 258 |
| 456 | 1614 | JEFFERSON ST N E 053-1402924120105 | S K MAXEY & L W MAXEY | 55413 | 479892 | 4983514 | 258 |
| 457 | 1610 | JEFFERSON ST N E 053-1402924120106 | GABRIEL MAZUR ETAL | 55413 | 479892 | 4983502 | 258 |
| 458 | 1606 | JEFFERSON ST N E 053-1402924120107 | L A BARKER & P J BARKER | 55413 | 479892 | 4983490 | 258 |
| 459 | 1600 | JEFFERSON ST N E 053-1402924120108 | COLEMAN P MORAST | 55413 | 479892 | 4983478 | 259 |
| 460 | 1542 | JEFFERSON ST N E 053-1402924120109 | SANDRA E THOMAS | 55413 | 479892 | 4983465 | 259 |
| 461 | 1536 | JEFFERSON ST N E 053-1402924120110 | JASON AMUNDSEN | 55413 | 479892 | 4983453 | 259 |
| 462 | 1534 | JEFFERSON ST N E 053-1402924120111 | MINNIE A DAVIS | 55413 | 479892 | 4983441 | 259 |
| 463 | 1528 | JEFFERSON ST N E 053-1402924120112 | ROGER T PETERSON ETAL | 55413 | 479892 | 4983429 | 259 |
| 464 | 1526 | JEFFERSON ST N E 053-1402924120113 | J & B AWAD | 55413 | 479892 | 4983416 | 258 |
| 465 | 1522 | JEFFERSON ST N E 053-1402924120114 | MICHAEL L DAVIS | 55413 | 479892 | 4983404 | 258 |
| 466 | 1518 | JEFFERSON ST N E 053-1402924120115 | W P MAVITY & G MARTY | 55413 | 479892 | 4983392 | 258 |
| 467 | 1514 | JEFFERSON ST N E 053-1402924120116 | K B SCHWEIGER/J Y SCHWEIGER | 55413 | 479892 | 4983380 | 258 |
| 468 | 1510 | JEFFERSON ST N E 053-1402924120117 | J P KRAKER & V L KRAKER | 55413 | 479892 | 4983368 | 258 |
| 469 | 1504 | JEFFERSON ST N E 053-1402924120118 | MARTIN C JOHNSON | 55413 | 479892 | 4983356 | 258 |
| 470 | 1502 | JEFFERSON ST N E 053-1402924120119 | H T HUSS & D T HUSS | 55413 | 479892 | 4983344 | 258 |
| 471 | 1507 | ADAMS ST N E 053-1402924120122 | MPLS PUBLIC HOUSING AUTH | 55413 | 479848 | 4983356 | 258 |
| 472 | 1511 | ADAMS ST N E 053-1402924120123 | L G & D E SEIFERT | 55413 | 479848 | 4983368 | 258 |
| 473 | 1515 | ADAMS ST N E 053-1402924120124 | THOMAS M STEWART | 55413 | 479848 | 4983380 | 258 |
| 474 | 1519 | ADAMS ST N E 053-1402924120125 | M R & B A KLESK | 55413 | 479848 | 4983392 | 258 |
| 475 | 1523 | ADAMS ST N E 053-1402924120126 | BEVERLY K ANDERSON | 55413 | 479848 | 4983404 | 258 |
| 476 | 1527 | ADAMS ST N E 053-1402924120127 | H A CARLSON ETAL | 55413 | 479848 | 4983416 | 258 |
| 477 | 1529 | ADAMS ST N E 053-1402924120128 | JOSEPH J SERAFIN | 55413 | 479848 | 4983429 | 258 |
| 478 | 1535 | ADAMS ST N E 053-1402924120129 | EDWARD J ULMANIEC JR | 55413 | 479848 | 4983441 | 258 |
| 479 | 1603 | ADAMS ST N E 053-1402924120130 | JACQUELINE G RODKEWICH | 55413 | 479848 | 4983453 | 258 |
| 480 | 1607 | ADAMS ST N E 053-1402924120131 | HENRY P KORMAN | 55413 | 479848 | 4983465 | 258 |
| 481 | 1611 | ADAMS ST N E 053-1402924120132 | J T SOGRODNECK ET AL | 55413 | 479848 | 4983477 | 258 |
| 482 | 1615 | ADAMS ST N E 053-1402924120133 | JOHN E SIKORA ETAL | 55413 | 479848 | 4983490 | 258 |
| 483 | 1621 | ADAMS ST N E 053-1402924120134 | R M & N K DEHLER | 55413 | 479848 | 4983508 | 258 |
| 484 | 1627 | ADAMS ST N E 053-1402924120135 | S L KIRPACH & G A KASNER | 55413 | 479848 | 4983526 | 258 |
| 485 | 1631 | ADAMS ST N E 053-1402924120136 | JEFFREY G MEYER | 55413 | 479848 | 4983538 | 258 |
| 486 | 648 | 17TH AVE N E 053-1402924120137 | LAVONNE GLORIA HEDRICK | 55413 | 479848 | 4983552 | 259 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | <u>Total</u> |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|--------------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 36-89DEP |
| 449 | 1611 ASHINGTON ST N E | 0.00003168 | 834 | 0.00047784 | 0.00482163 | 0.00040227 | 18,911 | 0.00653631 | 0.06097410 |
| 450 | 1619 ASHINGTON ST N E | 0.00003399 | 908 | 0.00050193 | 0.00536415 | 0.00042669 | 20,457 | 0.00682935 | 0.06970656 |
| 451 | 1621 ASHINGTON ST N E | 0.00003531 | 961 | 0.00056826 | 0.00554895 | 0.00044055 | 21,499 | 0.00750717 | 0.07035501 |
| 452 | 1626 JEFFERSON ST N E | 0.00009603 | 2,258 | 0.00141966 | 0.00852027 | 0.00116919 | 51,395 | 0.01841037 | 0.11397309 |
| 453 | 650 17TH AVE N E | 0.00008877 | 2,066 | 0.00128865 | 0.00791175 | 0.00110286 | 47,453 | 0.01718541 | 0.10834395 |
| 454 | 1622 JEFFERSON ST N E | 0.00007755 | 1,910 | 0.00118800 | 0.00728739 | 0.00095535 | 43,394 | 0.01517307 | 0.09678471 |
| 455 | 1618 JEFFERSON ST N E | 0.00006963 | 1,764 | 0.00109230 | 0.00687489 | 0.00086163 | 39,836 | 0.01449195 | 0.09452058 |
| 456 | 1614 JEFFERSON ST N E | 0.00006402 | 1,656 | 0.00105798 | 0.00626835 | 0.00079266 | 37,262 | 0.01381215 | 0.08078961 |
| 457 | 1610 JEFFERSON ST N E | 0.00005874 | 1,560 | 0.00110715 | 0.00626274 | 0.00073095 | 34,991 | 0.01360590 | 0.08045598 |
| 458 | 1606 JEFFERSON ST N E | 0.00005478 | 1,481 | 0.00112530 | 0.00638418 | 0.00068145 | 33,163 | 0.01337622 | 0.08109387 |
| 459 | 1600 JEFFERSON ST N E | 0.00005214 | 1,420 | 0.00114180 | 0.00646965 | 0.00065373 | 31,779 | 0.01392600 | 0.08585973 |
| 460 | 1542 JEFFERSON ST N E | 0.00004917 | 1,354 | 0.00108636 | 0.00606837 | 0.00061479 | 30,288 | 0.01337061 | 0.07863240 |
| 461 | 1536 JEFFERSON ST N E | 0.00004653 | 1,296 | 0.00101244 | 0.00579546 | 0.00058179 | 28,967 | 0.01251954 | 0.07620063 |
| 462 | 1534 JEFFERSON ST N E | 0.00004389 | 1,241 | 0.00092862 | 0.00533907 | 0.00055242 | 27,740 | 0.01149951 | 0.07135821 |
| 463 | 1528 JEFFERSON ST N E | 0.00004158 | 1,188 | 0.00083820 | 0.00506088 | 0.00052470 | 26,536 | 0.01038213 | 0.06510537 |
| 464 | 1526 JEFFERSON ST N E | 0.00003927 | 1,131 | 0.00076857 | 0.00468435 | 0.00049170 | 25,251 | 0.00994191 | 0.06062958 |
| 465 | 1522 JEFFERSON ST N E | 0.00003729 | 1,083 | 0.00076230 | 0.00444345 | 0.00046893 | 24,184 | 0.00997227 | 0.05830242 |
| 466 | 1518 JEFFERSON ST N E | 0.00003564 | 1,042 | 0.00075240 | 0.00436227 | 0.00044913 | 23,247 | 0.00993069 | 0.05515191 |
| 467 | 1514 JEFFERSON ST N E | 0.00003399 | 1,000 | 0.00074151 | 0.00420948 | 0.00042966 | 22,334 | 0.00985611 | 0.05355240 |
| 468 | 1510 JEFFERSON ST N E | 0.00003267 | 962 | 0.00072303 | 0.00406725 | 0.00041217 | 21,487 | 0.00966801 | 0.05304255 |
| 469 | 1504 JEFFERSON ST N E | 0.00003135 | 922 | 0.00070026 | 0.00409662 | 0.00039402 | 20,598 | 0.00941028 | 0.05172849 |
| 470 | 1502 JEFFERSON ST N E | 0.00003003 | 887 | 0.00067584 | 0.00407451 | 0.00037818 | 19,828 | 0.00911691 | 0.05193474 |
| 471 | 1507 ADAMS ST N E | 0.00002376 | 703 | 0.00057651 | 0.00394548 | 0.00030426 | 15,733 | 0.00724383 | 0.05181429 |
| 472 | 1511 ADAMS ST N E | 0.00002475 | 727 | 0.00061215 | 0.00423720 | 0.00031614 | 16,266 | 0.00768471 | 0.05575944 |
| 473 | 1515 ADAMS ST N E | 0.00002574 | 753 | 0.00064449 | 0.00458634 | 0.00032967 | 16,858 | 0.00807477 | 0.05960460 |
| 474 | 1519 ADAMS ST N E | 0.00002706 | 782 | 0.00066990 | 0.00485100 | 0.00034452 | 17,497 | 0.00835659 | 0.06205287 |
| 475 | 1523 ADAMS ST N E | 0.00002838 | 809 | 0.00068442 | 0.00497937 | 0.00036003 | 18,137 | 0.00848430 | 0.06258846 |
| 476 | 1527 ADAMS ST N E | 0.00002970 | 842 | 0.00068640 | 0.00495858 | 0.00037884 | 18,891 | 0.00843942 | 0.06360453 |
| 477 | 1529 ADAMS ST N E | 0.00003135 | 879 | 0.00067485 | 0.00483054 | 0.00040029 | 19,733 | 0.00827805 | 0.06415827 |
| 478 | 1535 ADAMS ST N E | 0.00003333 | 920 | 0.00064713 | 0.00488301 | 0.00042471 | 20,691 | 0.00840345 | 0.06348309 |
| 479 | 1603 ADAMS ST N E | 0.00003564 | 966 | 0.00063294 | 0.00512589 | 0.00045243 | 21,752 | 0.00838431 | 0.06661248 |
| 480 | 1607 ADAMS ST N E | 0.00003795 | 1,018 | 0.00065967 | 0.00541596 | 0.00048444 | 22,990 | 0.00870408 | 0.07166577 |
| 481 | 1611 ADAMS ST N E | 0.00004092 | 1,080 | 0.00071181 | 0.00574464 | 0.00052239 | 24,459 | 0.00943833 | 0.07457505 |
| 482 | 1615 ADAMS ST N E | 0.00004455 | 1,157 | 0.00076857 | 0.00567369 | 0.00056892 | 26,290 | 0.01020030 | 0.07554195 |
| 483 | 1621 ADAMS ST N E | 0.00005115 | 1,295 | 0.00083490 | 0.00570471 | 0.00065175 | 29,591 | 0.01095633 | 0.07870269 |
| 484 | 1627 ADAMS ST N E | 0.00005907 | 1,468 | 0.00102201 | 0.00648747 | 0.00075273 | 33,688 | 0.01371084 | 0.08415033 |
| 485 | 1631 ADAMS ST N E | 0.00006534 | 1,599 | 0.00111771 | 0.00681351 | 0.00082566 | 36,707 | 0.01438635 | 0.09094866 |
| 486 | 648 17TH AVE N E | 0.00007392 | 1,768 | 0.00111012 | 0.00745635 | 0.00093159 | 40,560 | 0.01440120 | 0.10351275 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|-----------------------|-------------------|-----------------------------|------------|----------------|----------------|----------------------|
| 487 | 1434 JEFFERSON ST N E | 053-1402924120138 | K & L MALARK | 55413 | 479891 | 4983311 | 259 |
| 488 | 1430 JEFFERSON ST N E | 053-1402924120139 | MPLS PUBLIC HSG AUTHORITY | 55413 | 479891 | 4983298 | 259 |
| 489 | 1426 JEFFERSON ST N E | 053-1402924120140 | C J DIEFENBACH ET AL | 55413 | 479891 | 4983286 | 259 |
| 490 | 1422 JEFFERSON ST N E | 053-1402924120141 | J L REMARKE ET AL W/L EST | 55413 | 479891 | 4983273 | 259 |
| 491 | 1420 JEFFERSON ST N E | 053-1402924120142 | WAYNE G BIORN | 55413 | 479891 | 4983260 | 259 |
| 492 | 1410 JEFFERSON ST N E | 053-1402924120143 | L G BECK ETAL | 55413 | 479891 | 4983248 | 259 |
| 493 | 1415 ADAMS ST N E | 053-1402924120144 | B M FRELS & N SOMMER | 55413 | 479848 | 4983248 | 258 |
| 494 | 1421 ADAMS ST N E | 053-1402924120145 | B & G DOOLITTLE | 55413 | 479848 | 4983266 | 258 |
| 495 | 1427 ADAMS ST N E | 053-1402924120146 | ADAM CHASE ET AL | 55413 | 479848 | 4983284 | 258 |
| 496 | 1431 ADAMS ST N E | 053-1402924120147 | ELIZABETH SOLL | 55413 | 479848 | 4983298 | 258 |
| 497 | 1435 ADAMS ST N E | 053-1402924120148 | W J SCHAEFER & J A SCHAEFER | 55413 | 479848 | 4983311 | 258 |
| 498 | 636 15TH AVE N E | 053-1402924120149 | M F ANDERSON & Y M ANDERSON | 55413 | 479791 | 4983311 | 258 |
| 499 | 1430 ADAMS ST N E | 053-1402924120150 | JANET PAONE | 55413 | 479791 | 4983297 | 258 |
| 500 | 1426 ADAMS ST N E | 053-1402924120151 | TADEO DUDZIAK ETAL | 55413 | 479791 | 4983282 | 258 |
| 501 | 1418 ADAMS ST N E | 053-1402924120152 | L A & P J KUTZLER | 55413 | 479791 | 4983266 | 258 |
| 502 | 1416 ADAMS ST N E | 053-1402924120153 | ROBERT L JULKOWSKI ETAL | 55413 | 479791 | 4983250 | 258 |
| 503 | 1415 ASHINGTON ST N E | 053-1402924120154 | SUSAN K FALLON | 55413 | 479747 | 4983249 | 258 |
| 504 | 1419 ASHINGTON ST N E | 053-1402924120155 | E J MORTENSON ET AL | 55413 | 479747 | 4983262 | 258 |
| 505 | 1423 ASHINGTON ST N E | 053-1402924120156 | K P & P A HALLETT | 55413 | 479747 | 4983274 | 258 |
| 506 | 1425 ASHINGTON ST N E | 053-1402924120157 | NICK BASIL ETAL | 55413 | 479747 | 4983286 | 258 |
| 507 | 1431 ASHINGTON ST N E | 053-1402924120158 | JOSEPH A GODAVA ETAL | 55413 | 479747 | 4983298 | 258 |
| 508 | 1435 ASHINGTON ST N E | 053-1402924120159 | M M BENSON & S G GORMAN | 55413 | 479747 | 4983311 | 258 |
| 509 | 1602 MONROE ST N E | 053-1402924120160 | CONSTANZA ROOD | 55413 | 480093 | 4983461 | 258 |
| 510 | 1536 MONROE ST N E | 053-1402924120161 | FRANCES MEULENERS | 55413 | 480093 | 4983449 | 258 |
| 511 | 1532 MONROE ST N E | 053-1402924120162 | STEVEN M MITSCH | 55413 | 480093 | 4983436 | 258 |
| 512 | 1528 MONROE ST N E | 053-1402924120163 | GREATER MPLS METRO HSG CORP | 55413 | 480093 | 4983424 | 258 |
| 513 | 1524 MONROE ST N E | 053-1402924120164 | GENE C THOMPSON II | 55413 | 480093 | 4983411 | 258 |
| 514 | 1518 MONROE ST N E | 053-1402924120165 | WALTER W KRIENKE | 55413 | 480093 | 4983399 | 258 |
| 515 | 1514 MONROE ST N E | 053-1402924120166 | GREGORY J HOSTRAWSER | 55413 | 480093 | 4983387 | 258 |
| 516 | 1512 MONROE ST N E | 053-1402924120167 | A M SARNA ET AL W/L EST | 55413 | 480093 | 4983374 | 258 |
| 517 | 1508 MONROE ST N E | 053-1402924120168 | T L DERASMI & J R DERASMI | 55413 | 480093 | 4983362 | 258 |
| 518 | 1500 MONROE ST N E | 053-1402924120169 | J K NELSON & J F BIROSH JR | 55413 | 480093 | 4983346 | 258 |
| 519 | 1501 MADISON ST N E | 053-1402924120170 | D MERCIL & J MERCIL | 55413 | 480050 | 4983346 | 258 |
| 520 | 1507 MADISON ST N E | 053-1402924120171 | GRACE G JOHNSON ET AL W/L E | 55413 | 480050 | 4983362 | 258 |
| 521 | 1511 MADISON ST N E | 053-1402924120172 | TIMOTHY S KENNEDY | 55413 | 480050 | 4983375 | 258 |
| 522 | 1515 MADISON ST N E | 053-1402924120173 | NICK JEFFERY PERLICK | 55413 | 480050 | 4983387 | 258 |
| 523 | 1519 MADISON ST N E | 053-1402924120174 | ROGER A FREDRICKSON | 55413 | 480050 | 4983399 | 258 |
| 524 | 1523 MADISON ST N E | 053-1402924120175 | DALE A ABRAHAMSON | 55413 | 480050 | 4983411 | 258 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | |
|---------|-----------------------|------------|--------------------|------------|------------|-------------------|----------|------------|------------|----------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP |
| 487 | 1434 JEFFERSON ST N E | 0.00002706 | 802 | 0.00061050 | 0.00396033 | 0.00034221 | 17,927 | 0.00831567 | 0.05219214 | 18,729 |
| 488 | 1430 JEFFERSON ST N E | 0.00002574 | 769 | 0.00057783 | 0.00380391 | 0.00032736 | 17,192 | 0.00787677 | 0.05050122 | 17,961 |
| 489 | 1426 JEFFERSON ST N E | 0.00002475 | 740 | 0.00054615 | 0.00363858 | 0.00031449 | 16,557 | 0.00745602 | 0.04860009 | 17,297 |
| 490 | 1422 JEFFERSON ST N E | 0.00002376 | 712 | 0.00051546 | 0.00353430 | 0.00030195 | 15,919 | 0.00703692 | 0.04677717 | 16,631 |
| 491 | 1420 JEFFERSON ST N E | 0.00002277 | 685 | 0.00048576 | 0.00342903 | 0.00029007 | 15,321 | 0.00662937 | 0.04564395 | 16,007 |
| 492 | 1410 JEFFERSON ST N E | 0.00002211 | 661 | 0.00045672 | 0.00331353 | 0.00027918 | 14,779 | 0.00622974 | 0.04433055 | 15,439 |
| 493 | 1415 ADAMS ST N E | 0.00001782 | 533 | 0.00042240 | 0.00360624 | 0.00022539 | 11,900 | 0.00570669 | 0.04562910 | 12,433 |
| 494 | 1421 ADAMS ST N E | 0.00001848 | 556 | 0.00043032 | 0.00382965 | 0.00023595 | 12,421 | 0.00578655 | 0.04775562 | 12,977 |
| 495 | 1427 ADAMS ST N E | 0.00001947 | 583 | 0.00043725 | 0.00402138 | 0.00024816 | 13,036 | 0.00583308 | 0.04916604 | 13,620 |
| 496 | 1431 ADAMS ST N E | 0.00002013 | 605 | 0.00044022 | 0.00410388 | 0.00025740 | 13,494 | 0.00583440 | 0.04933401 | 14,098 |
| 497 | 1435 ADAMS ST N E | 0.00002079 | 625 | 0.00044187 | 0.00412929 | 0.00026697 | 13,959 | 0.00581922 | 0.04869777 | 14,584 |
| 498 | 636 15TH AVE N E | 0.00001584 | 469 | 0.00041250 | 0.00365442 | 0.00020658 | 10,540 | 0.00519288 | 0.04789092 | 11,009 |
| 499 | 1430 ADAMS ST N E | 0.00001551 | 454 | 0.00041019 | 0.00361647 | 0.00019833 | 10,185 | 0.00519024 | 0.04794174 | 10,639 |
| 500 | 1426 ADAMS ST N E | 0.00001485 | 438 | 0.00040161 | 0.00348843 | 0.00019041 | 9,837 | 0.00509949 | 0.04671777 | 10,275 |
| 501 | 1418 ADAMS ST N E | 0.00001419 | 424 | 0.00038742 | 0.00327690 | 0.00018249 | 9,492 | 0.00492426 | 0.04428303 | 9,916 |
| 502 | 1416 ADAMS ST N E | 0.00001353 | 410 | 0.00036828 | 0.00304788 | 0.00017556 | 9,173 | 0.00468930 | 0.04104573 | 9,583 |
| 503 | 1415 ASHINGTON ST N E | 0.00001155 | 343 | 0.00029733 | 0.00286737 | 0.00015114 | 7,716 | 0.00375177 | 0.03785925 | 8,059 |
| 504 | 1419 ASHINGTON ST N E | 0.00001188 | 353 | 0.00029172 | 0.00278850 | 0.00015642 | 7,928 | 0.00366102 | 0.03698013 | 8,281 |
| 505 | 1423 ASHINGTON ST N E | 0.00001254 | 362 | 0.00028314 | 0.00294459 | 0.00016203 | 8,166 | 0.00365640 | 0.03993462 | 8,528 |
| 506 | 1425 ASHINGTON ST N E | 0.00001287 | 374 | 0.00027159 | 0.00314787 | 0.00016863 | 8,425 | 0.00367092 | 0.04236507 | 8,799 |
| 507 | 1431 ASHINGTON ST N E | 0.00001353 | 385 | 0.00026730 | 0.00329208 | 0.00017490 | 8,686 | 0.00365508 | 0.04394808 | 9,071 |
| 508 | 1435 ASHINGTON ST N E | 0.00001419 | 399 | 0.00026565 | 0.00339141 | 0.00018315 | 9,023 | 0.00364617 | 0.04477143 | 9,422 |
| 509 | 1602 MONROE ST N E | 0.00007392 | 2,633 | 0.00070620 | 0.00521499 | 0.00094182 | 59,859 | 0.00903606 | 0.06571884 | 62,492 |
| 510 | 1536 MONROE ST N E | 0.00006765 | 2,408 | 0.00074547 | 0.00519618 | 0.00086361 | 54,692 | 0.00956043 | 0.06679794 | 57,100 |
| 511 | 1532 MONROE ST N E | 0.00006237 | 2,212 | 0.00077748 | 0.00508497 | 0.00079497 | 50,169 | 0.01008315 | 0.06608844 | 52,381 |
| 512 | 1528 MONROE ST N E | 0.00005742 | 2,034 | 0.00079002 | 0.00499191 | 0.00073326 | 46,104 | 0.01037124 | 0.06573996 | 48,138 |
| 513 | 1524 MONROE ST N E | 0.00005280 | 1,876 | 0.00078804 | 0.00504504 | 0.00067749 | 42,511 | 0.01044912 | 0.06348276 | 44,386 |
| 514 | 1518 MONROE ST N E | 0.00004917 | 1,742 | 0.00077484 | 0.00499059 | 0.00063030 | 39,434 | 0.01035111 | 0.06215847 | 41,175 |
| 515 | 1514 MONROE ST N E | 0.00004587 | 1,623 | 0.00075372 | 0.00485001 | 0.00058872 | 36,743 | 0.01012869 | 0.06111996 | 38,366 |
| 516 | 1512 MONROE ST N E | 0.00004290 | 1,515 | 0.00072963 | 0.00464541 | 0.00055044 | 34,258 | 0.00982080 | 0.05908353 | 35,773 |
| 517 | 1508 MONROE ST N E | 0.00004026 | 1,420 | 0.00069762 | 0.00438669 | 0.00051678 | 32,122 | 0.00942744 | 0.05620725 | 33,541 |
| 518 | 1500 MONROE ST N E | 0.00003696 | 1,301 | 0.00065307 | 0.00433587 | 0.00047487 | 29,379 | 0.00886314 | 0.05570796 | 30,680 |
| 519 | 1501 MADISON ST N E | 0.00004092 | 1,358 | 0.00048642 | 0.00423522 | 0.00052206 | 30,654 | 0.00666864 | 0.05418105 | 32,012 |
| 520 | 1507 MADISON ST N E | 0.00004422 | 1,471 | 0.00054120 | 0.00440946 | 0.00056529 | 33,238 | 0.00740487 | 0.05540040 | 34,709 |
| 521 | 1511 MADISON ST N E | 0.00004719 | 1,569 | 0.00059037 | 0.00459030 | 0.00060225 | 35,492 | 0.00802890 | 0.05716524 | 37,061 |
| 522 | 1515 MADISON ST N E | 0.00005049 | 1,676 | 0.00064383 | 0.00476322 | 0.00064350 | 37,925 | 0.00873774 | 0.05865948 | 39,601 |
| 523 | 1519 MADISON ST N E | 0.00005379 | 1,793 | 0.00070224 | 0.00490611 | 0.00068772 | 40,564 | 0.00948618 | 0.06016725 | 42,357 |
| 524 | 1523 MADISON ST N E | 0.00005808 | 1,927 | 0.00076451 | 0.00501600 | 0.00073854 | 43,635 | 0.01029138 | 0.06267162 | 45,562 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|------------------|---|------------|----------------|----------------|----------------------|
| 525 | 1527 | MADISON ST N E | 053-1402924120176 MICHELE E MCCABE | 55413 | 480050 | 4983424 | 258 |
| 526 | 1531 | MADISON ST N E | 053-1402924120177 D W FREEMAN & R A FREEMAN | 55413 | 480050 | 4983436 | 258 |
| 527 | 1535 | MADISON ST N E | 053-1402924120178 D TERNES & G S PETERSON | 55413 | 480050 | 4983448 | 257 |
| 528 | 1601 | MADISON ST N E | 053-1402924120179 ELIZABETH SOLL | 55413 | 480050 | 4983460 | 257 |
| 529 | 1432 | MONROE ST N E | 053-1402924120180 L S & S J BERNSTEIN | 55413 | 480093 | 4983309 | 258 |
| 530 | 1426 | MONROE ST N E | 053-1402924120181 S J PETERSON & P A PETERSON | 55413 | 480093 | 4983293 | 258 |
| 531 | 1424 | MONROE ST N E | 053-1402924120182 NE ASSEMBLY OF GOD INC | 55413 | 480093 | 4983273 | 258 |
| 532 | 1412 | MONROE ST N E | 053-1402924120183 ROBERT & CECELIA VELST | 55413 | 480093 | 4983255 | 258 |
| 533 | 1408 | MONROE ST N E | 053-1402924120184 JOHN S SURMA | 55413 | 480093 | 4983242 | 258 |
| 534 | 1407 | MADISON ST N E | 053-1402924120185 B M BENDER & D PREUSS | 55413 | 480051 | 4983242 | 259 |
| 535 | 1415 | MADISON ST N E | 053-1402924120186 JUDITH D RENSCH | 55413 | 480051 | 4983254 | 259 |
| 536 | 1417 | MADISON ST N E | 053-1402924120187 K & C HANZELY | 55413 | 480051 | 4983267 | 259 |
| 537 | 1423 | MADISON ST N E | 053-1402924120188 NORMA B BAUER | 55413 | 480051 | 4983280 | 259 |
| 538 | 1425 | MADISON ST N E | 053-1402924120189 J V & M A ORTH | 55413 | 480051 | 4983292 | 259 |
| 539 | 1429 | MADISON ST N E | 053-1402924120190 NEW COMMANDMENT CHURCH | 55413 | 480050 | 4983308 | 258 |
| 540 | 1418 | MADISON ST N E | 053-1402924120193 J A MCCONNELL & T L JONES | 55413 | 479993 | 4983269 | 259 |
| 541 | 1416 | MADISON ST N E | 053-1402924120194 JOHN A RUSH | 55413 | 479993 | 4983256 | 259 |
| 542 | 1410 | MADISON ST N E | 053-1402924120195 TOM N CHRISTIANSEN | 55413 | 479993 | 4983244 | 259 |
| 543 | 1411 | JEFFERSON ST N E | 053-1402924120196 JOHN P GALLO | 55413 | 479949 | 4983246 | 259 |
| 544 | 1417 | JEFFERSON ST N E | 053-1402924120197 L & M FRESONKE | 55413 | 479949 | 4983257 | 259 |
| 545 | 1419 | JEFFERSON ST N E | 053-1402924120198 JEAN M PURCELL | 55413 | 479949 | 4983270 | 259 |
| 546 | 1421 | JEFFERSON ST N E | 053-1402924120199 ROY W WARME ETAL | 55413 | 479949 | 4983282 | 259 |
| 547 | 1701 | MADISON ST N E | 053-1402924120200 JAMES T NYSTROM | 55413 | 480069 | 4983612 | 255 |
| 548 | 1627 | ASHINGTON ST N E | 053-1402924120202 TORNADO COMPANY INC | 55413 | 479747 | 4983546 | 259 |
| 549 | 1501 | ADAMS ST N E | 053-1402924120203 JAMES KRASKY | 55413 | 479848 | 4983343 | 258 |
| 550 | 1420 | MADISON ST N E | 053-1402924120205 HELEN EVASCHUK | 55413 | 479993 | 4983282 | 259 |
| 551 | 1701 | ADAMS ST N E | 053-1402924120206 KRIS M KENNEDY | 55413 | 479834 | 4983591 | 259 |
| 552 | 649 | 17TH AVE N E | 053-1402924120207 ROBERT P CARLIN | 55413 | 479855 | 4983591 | 259 |
| 553 | 1406 | JEFFERSON ST N E | 053-1402924130002 LISA HURTUBISE/JULIE JACOBS | 55413 | 479891 | 4983236 | 259 |
| 554 | 1402 | JEFFERSON ST N E | 053-1402924130003 ELLEN RUTH PETTY TRUSTEE | 55413 | 479891 | 4983224 | 259 |
| 555 | 1338 | JEFFERSON ST N E | 053-1402924130004 M E DEPAUW & C M RINALDO | 55413 | 479891 | 4983212 | 259 |
| 556 | 1334 | JEFFERSON ST N E | 053-1402924130005 D D & L L WELLER | 55413 | 479891 | 4983200 | 259 |
| 557 | 1328 | JEFFERSON ST N E | 053-1402924130006 THOMAS A SWANSON | 55413 | 479891 | 4983188 | 259 |
| 558 | 1337 | ADAMS ST N E | 053-1402924130021 R G & K L VANDERWOOD | 55413 | 479848 | 4983200 | 258 |
| 559 | 1401 | ADAMS ST N E | 053-1402924130022 E T ANDERSON & J RUBIN | 55413 | 479848 | 4983212 | 258 |
| 560 | 1407 | ADAMS ST N E | 053-1402924130023 W J KOVENSKY & D J KOVENSKY | 55413 | 479848 | 4983224 | 258 |
| 561 | 1411 | ADAMS ST N E | 053-1402924130024 E & H ROLF | 55413 | 479848 | 4983236 | 258 |
| 562 | 1408 | ADAMS ST N E | 053-1402924130025 ROBERT S MITLYNG | 55413 | 479791 | 4983237 | 258 |

| HOUSENO | STREET | POST-BAGHOUSE CASE | | | | PRE-BAGHOUSE CASE | | | | Total | |
|---------|-----------------------|--------------------|----------|------------|------------|-------------------|----------|------------|------------|----------|--|
| | | PER CONC | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP | |
| 525 | 1527 MADISON ST N E | 0.00006237 | 2,077 | 0.00083457 | 0.00508530 | 0.00079596 | 47,057 | 0.01118568 | 0.06579936 | 49,133 | |
| 526 | 1531 MADISON ST N E | 0.00006765 | 2,247 | 0.00091344 | 0.00543543 | 0.00086130 | 50,963 | 0.01213872 | 0.07130112 | 53,210 | |
| 527 | 1535 MADISON ST N E | 0.00007227 | 2,415 | 0.00095337 | 0.00556413 | 0.00091344 | 54,769 | 0.01248258 | 0.07144203 | 57,184 | |
| 528 | 1601 MADISON ST N E | 0.00007887 | 2,634 | 0.00102828 | 0.00591360 | 0.00099462 | 59,760 | 0.01332243 | 0.07492221 | 62,394 | |
| 529 | 1432 MONROE ST N E | 0.00003102 | 1,091 | 0.00054549 | 0.00402435 | 0.00040062 | 24,603 | 0.00747615 | 0.05266767 | 25,694 | |
| 530 | 1426 MONROE ST N E | 0.00002904 | 1,015 | 0.00050127 | 0.00381282 | 0.00037356 | 22,877 | 0.00688380 | 0.05016792 | 23,891 | |
| 531 | 1424 MONROE ST N E | 0.00002673 | 935 | 0.00045276 | 0.00353826 | 0.00034485 | 21,055 | 0.00622677 | 0.04677024 | 21,990 | |
| 532 | 1412 MONROE ST N E | 0.00002475 | 865 | 0.00041151 | 0.00327525 | 0.00032043 | 19,469 | 0.00566907 | 0.04343361 | 20,334 | |
| 533 | 1408 MONROE ST N E | 0.00002376 | 826 | 0.00038412 | 0.00320496 | 0.00030558 | 18,566 | 0.00529716 | 0.04246737 | 19,392 | |
| 534 | 1407 MADISON ST N E | 0.00002607 | 864 | 0.00033990 | 0.00351219 | 0.00033594 | 19,446 | 0.00430287 | 0.04708308 | 20,309 | |
| 535 | 1415 MADISON ST N E | 0.00002739 | 905 | 0.00035046 | 0.00362604 | 0.00035211 | 20,394 | 0.00441441 | 0.04849779 | 21,299 | |
| 536 | 1417 MADISON ST N E | 0.00002871 | 954 | 0.00036135 | 0.00374484 | 0.00037092 | 21,511 | 0.00453057 | 0.04995309 | 22,465 | |
| 537 | 1423 MADISON ST N E | 0.00003036 | 1,007 | 0.00037323 | 0.00386760 | 0.00039105 | 22,703 | 0.00464838 | 0.05142357 | 23,710 | |
| 538 | 1425 MADISON ST N E | 0.00003201 | 1,060 | 0.00038379 | 0.00397848 | 0.00041118 | 23,895 | 0.00486321 | 0.05271420 | 24,954 | |
| 539 | 1429 MADISON ST N E | 0.00003399 | 1,131 | 0.00038907 | 0.00398970 | 0.00043626 | 25,508 | 0.00524568 | 0.05218059 | 26,639 | |
| 540 | 1418 MADISON ST N E | 0.00003168 | 973 | 0.00042768 | 0.00360063 | 0.00040491 | 21,859 | 0.00571923 | 0.04711806 | 22,832 | |
| 541 | 1416 MADISON ST N E | 0.00003003 | 925 | 0.00040788 | 0.00349734 | 0.00038478 | 20,792 | 0.00544929 | 0.04595382 | 21,717 | |
| 542 | 1410 MADISON ST N E | 0.00002871 | 881 | 0.00039039 | 0.00339735 | 0.00036630 | 19,802 | 0.00521103 | 0.04480542 | 20,683 | |
| 543 | 1411 JEFFERSON ST N E | 0.00002706 | 816 | 0.00044781 | 0.00359106 | 0.00034485 | 18,277 | 0.00625977 | 0.04806813 | 19,094 | |
| 544 | 1417 JEFFERSON ST N E | 0.00002838 | 852 | 0.00046728 | 0.00370623 | 0.00036036 | 19,083 | 0.00652971 | 0.04945446 | 19,935 | |
| 545 | 1419 JEFFERSON ST N E | 0.00002970 | 895 | 0.00049005 | 0.00383328 | 0.00037884 | 20,057 | 0.00684123 | 0.05096586 | 20,952 | |
| 546 | 1421 JEFFERSON ST N E | 0.00003135 | 942 | 0.00051513 | 0.00396792 | 0.00039930 | 21,119 | 0.00718740 | 0.05252874 | 22,061 | |
| 547 | 1701 MADISON ST N E | 0.00035805 | 12,469 | 0.00227403 | 0.00806652 | 0.00378279 | 303,110 | 0.02613930 | 0.09274485 | 315,580 | |
| 548 | 1627 ASHINGTON ST N E | 0.00003663 | 1,015 | 0.00063162 | 0.00545358 | 0.00045111 | 22,562 | 0.00830973 | 0.06939636 | 23,577 | |
| 549 | 1501 ADAMS ST N E | 0.00002310 | 682 | 0.00053823 | 0.00390885 | 0.00029337 | 15,228 | 0.00676533 | 0.04855884 | 15,910 | |
| 550 | 1420 MADISON ST N E | 0.00003366 | 1,028 | 0.00045210 | 0.00371613 | 0.00042834 | 23,115 | 0.00603471 | 0.04839054 | 24,142 | |
| 551 | 1701 ADAMS ST N E | 0.00007986 | 1,973 | 0.00130251 | 0.00800184 | 0.00096360 | 44,350 | 0.01680954 | 0.10340154 | 46,323 | |
| 552 | 649 17TH AVE N E | 0.00009702 | 2,277 | 0.00146124 | 0.00883971 | 0.00117381 | 51,741 | 0.01926441 | 0.12141756 | 54,019 | |
| 553 | 1406 JEFFERSON ST N E | 0.00002112 | 638 | 0.00042966 | 0.00319539 | 0.00026895 | 14,260 | 0.00586674 | 0.04293795 | 14,898 | |
| 554 | 1402 JEFFERSON ST N E | 0.00002046 | 615 | 0.00040491 | 0.00307263 | 0.00025938 | 13,769 | 0.00552288 | 0.04145724 | 14,384 | |
| 555 | 1338 JEFFERSON ST N E | 0.00001980 | 595 | 0.00038115 | 0.00296043 | 0.00025014 | 13,296 | 0.00519585 | 0.03991449 | 13,891 | |
| 556 | 1334 JEFFERSON ST N E | 0.00001881 | 574 | 0.00035607 | 0.00286011 | 0.00024123 | 12,824 | 0.00485760 | 0.03827439 | 13,398 | |
| 557 | 1328 JEFFERSON ST N E | 0.00001815 | 555 | 0.00033528 | 0.00277002 | 0.00023298 | 12,399 | 0.00456621 | 0.03699993 | 12,954 | |
| 558 | 1337 ADAMS ST N E | 0.00001584 | 476 | 0.00038742 | 0.00283536 | 0.00019965 | 10,621 | 0.00527835 | 0.03779952 | 11,097 | |
| 559 | 1401 ADAMS ST N E | 0.00001617 | 489 | 0.00039831 | 0.00303501 | 0.00020559 | 10,912 | 0.00541695 | 0.03943104 | 11,401 | |
| 560 | 1407 ADAMS ST N E | 0.00001683 | 504 | 0.00040821 | 0.00323301 | 0.00021219 | 11,250 | 0.00554037 | 0.04170408 | 11,754 | |
| 561 | 1411 ADAMS ST N E | 0.00001716 | 517 | 0.00041448 | 0.00342210 | 0.00021813 | 11,534 | 0.00561792 | 0.04369695 | 12,050 | |
| 562 | 1408 ADAMS ST N E | 0.00001320 | 399 | 0.00035013 | 0.00294756 | 0.00017028 | 8,922 | 0.00446028 | 0.03908982 | 9,321 | |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|------------------|--|------------|----------------|----------------|----------------------|
| 563 | 1402 | ADAMS ST N E | 053-1402924130026 H W BENSON & D J MCBRIAN | 55413 | 479791 | 4983225 | 258 |
| 564 | 1411 | ASHINGTON ST N E | 053-1402924130047 K A CONNOLE & T L RICHARDSON | 55413 | 479747 | 4983237 | 258 |
| 565 | 1406 | MONROE ST N E | 053-1402924130116 B MOLOCZIJ & R BOLOCZIJ | 55413 | 480093 | 4983231 | 258 |
| 566 | 1400 | MONROE ST N E | 053-1402924130117 E J & R E STEWART | 55413 | 480093 | 4983219 | 258 |
| 567 | 1334 | MONROE ST N E | 053-1402924130118 ELIZABETH ANN KOLODGE | 55413 | 480094 | 4983205 | 258 |
| 568 | 1335 | MADISON ST N E | 053-1402924130119 WRAM INVESTMENTS | 55413 | 480051 | 4983206 | 259 |
| 569 | 1401 | MADISON ST N E | 053-1402924130120 CHAD E & NICHOLE J NEUMANN | 55413 | 480051 | 4983219 | 259 |
| 570 | 1405 | MADISON ST N E | 053-1402924130121 MARGARET UTKE | 55413 | 480051 | 4983231 | 259 |
| 571 | 1330 | MONROE ST N E | 053-1402924130122 DENNIS E FRANCIS ETAL | 55413 | 480094 | 4983193 | 258 |
| 572 | 1327 | MADISON ST N E | 053-1402924130132 GERALD J STEGORA | 55413 | 480051 | 4983181 | 259 |
| 573 | 1331 | MADISON ST N E | 053-1402924130133 KATHERINE M BETTS | 55413 | 480051 | 4983193 | 259 |
| 574 | 1328 | MADISON ST N E | 053-1402924130134 RICHARD J LEE | 55413 | 479993 | 4983193 | 259 |
| 575 | 1326 | MADISON ST N E | 053-1402924130135 COREY MICHEAL DEGRIS | 55413 | 479993 | 4983181 | 259 |
| 576 | 1327 | JEFFERSON ST N E | 053-1402924130147 M D NELSON & I NELSON | 55413 | 479950 | 4983181 | 259 |
| 577 | 1331 | JEFFERSON ST N E | 053-1402924130148 E ANTOLAK ETAL | 55413 | 479949 | 4983194 | 259 |
| 578 | 1406 | MADISON ST N E | 053-1402924130149 THADDEUS NICKEL ETAL | 55413 | 479993 | 4983233 | 259 |
| 579 | 1402 | MADISON ST N E | 053-1402924130150 KAY E PANNER | 55413 | 479993 | 4983222 | 259 |
| 580 | 1332 | MADISON ST N E | 053-1402924130151 CAROLINE CISEWSKI | 55413 | 479993 | 4983208 | 259 |
| 581 | 1333 | JEFFERSON ST N E | 053-1402924130152 THOMAS J STREETER | 55413 | 479949 | 4983208 | 259 |
| 582 | 1401 | JEFFERSON ST N E | 053-1402924130153 P A BUSHILLA & M G BUSHILLA | 55413 | 479949 | 4983222 | 259 |
| 583 | 1407 | JEFFERSON ST N E | 053-1402924130154 J P & S K FETYKO | 55413 | 479949 | 4983234 | 259 |
| 584 | 1407 | MONROE ST N E | 053-1402924140010 LAWRENCE R SOLAND ETAL | 55413 | 480150 | 4983234 | 258 |
| 585 | 1403 | MONROE ST N E | 053-1402924140068 F D NEWMAN & C L NEWMAN | 55413 | 480150 | 4983222 | 258 |
| 586 | 1337 | MONROE ST N E | 053-1402924140069 MIKKEL R MALAND ETAL | 55413 | 480150 | 4983210 | 258 |
| 587 | 1422 | ASHINGTON ST N E | 053-1402924210045 M V VOSS & C VOSS | 55413 | 479690 | 4983275 | 259 |
| 588 | 1426 | ASHINGTON ST N E | 053-1402924210046 FLOYD L CURRY | 55413 | 479690 | 4983287 | 259 |
| 589 | 1428 | ASHINGTON ST N E | 053-1402924210047 I & M BERGSAGEL ET AL | 55413 | 479690 | 4983299 | 259 |
| 590 | 1432 | ASHINGTON ST N E | 053-1402924210048 G K JOHNSON & B R JOHNSON | 55413 | 479690 | 4983311 | 259 |
| 591 | 1435 | 6TH ST N E | 053-1402924210049 T & H ATWELL | 55413 | 479645 | 4983312 | 259 |
| 592 | 1431 | 6TH ST N E | 053-1402924210050 DALE W POMEROY ET AL | 55413 | 479645 | 4983299 | 259 |
| 593 | 1506 | ASHINGTON ST N E | 053-1402924210055 KALE R JOHNSON ET AL | 55413 | 479690 | 4983351 | 259 |
| 594 | 1510 | ASHINGTON ST N E | 053-1402924210056 BERNARD R UBL ETAL | 55413 | 479690 | 4983369 | 259 |
| 595 | 1514 | ASHINGTON ST N E | 053-1402924210057 WALTER STETZ | 55413 | 479690 | 4983381 | 259 |
| 596 | 1518 | ASHINGTON ST N E | 053-1402924210058 G A SCHROEDER & M L SCHMIDT | 55413 | 479690 | 4983393 | 259 |
| 597 | 1520 | ASHINGTON ST N E | 053-1402924210059 T M SCALZO & M L JOHNSON | 55413 | 479690 | 4983405 | 259 |
| 598 | 1526 | ASHINGTON ST N E | 053-1402924210060 EUGENE R SERIE ETAL | 55413 | 479690 | 4983417 | 259 |
| 599 | 1530 | ASHINGTON ST N E | 053-1402924210061 MYCHOL ZASTAWNÝ ETAL | 55413 | 479690 | 4983429 | 259 |
| 600 | 1534 | ASHINGTON ST N E | 053-1402924210062 ELIZABETH SOLANYNA | 55413 | 479690 | 4983441 | 259 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | <u>Total</u> | | |
|---------|--------|------------------|--------------------|-----------|------------|-------------------|------------|-----------|--------------|------------|--------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | | |
| 563 | 1402 | ADAMS ST N E | 0.00001287 | 390 | 0.00033363 | 0.00307131 | 0.00016566 | 8,708 | 0.00424116 | 0.03801501 | 9,098 |
| 564 | 1411 | ASHINGTON ST N E | 0.00001122 | 334 | 0.00030063 | 0.00290400 | 0.00014619 | 7,512 | 0.00380886 | 0.03866478 | 7,846 |
| 565 | 1406 | MONROE ST N E | 0.00002277 | 788 | 0.00036102 | 0.00315051 | 0.00029238 | 17,711 | 0.00498762 | 0.04187205 | 18,499 |
| 566 | 1400 | MONROE ST N E | 0.00002178 | 753 | 0.00033924 | 0.00308550 | 0.00028017 | 16,939 | 0.00468732 | 0.04111536 | 17,692 |
| 567 | 1334 | MONROE ST N E | 0.00002079 | 719 | 0.00031581 | 0.00300762 | 0.00026763 | 16,157 | 0.00438306 | 0.04017288 | 16,876 |
| 568 | 1335 | MADISON ST N E | 0.00002277 | 753 | 0.00030987 | 0.00317493 | 0.00029370 | 16,949 | 0.00396660 | 0.04280133 | 17,702 |
| 569 | 1401 | MADISON ST N E | 0.00002376 | 790 | 0.00032043 | 0.00329274 | 0.00030756 | 17,774 | 0.00408705 | 0.04431075 | 18,564 |
| 570 | 1405 | MADISON ST N E | 0.00002508 | 828 | 0.00033033 | 0.00340395 | 0.00032208 | 18,640 | 0.00419859 | 0.04572447 | 19,468 |
| 571 | 1330 | MONROE ST N E | 0.00001980 | 688 | 0.00029535 | 0.00292248 | 0.00025608 | 15,446 | 0.00410322 | 0.03912579 | 16,134 |
| 572 | 1327 | MADISON ST N E | 0.00002079 | 689 | 0.00029007 | 0.00295383 | 0.00026862 | 15,484 | 0.00373725 | 0.03993396 | 16,173 |
| 573 | 1331 | MADISON ST N E | 0.00002178 | 720 | 0.00029964 | 0.00306108 | 0.00028050 | 16,179 | 0.00384879 | 0.04132425 | 16,899 |
| 574 | 1328 | MADISON ST N E | 0.00002343 | 727 | 0.00033363 | 0.0030861 | 0.00030096 | 16,305 | 0.00454443 | 0.04017882 | 17,032 |
| 575 | 1326 | MADISON ST N E | 0.00002244 | 696 | 0.00032241 | 0.00292248 | 0.00028776 | 15,594 | 0.00439989 | 0.03912150 | 16,291 |
| 576 | 1327 | JEFFERSON ST N E | 0.00002145 | 653 | 0.00035838 | 0.00300432 | 0.00027423 | 14,601 | 0.00502029 | 0.04074642 | 15,254 |
| 577 | 1331 | JEFFERSON ST N E | 0.00002244 | 680 | 0.00037323 | 0.00310695 | 0.00028578 | 15,198 | 0.00522555 | 0.04205025 | 15,878 |
| 578 | 1406 | MADISON ST N E | 0.00002739 | 841 | 0.00037422 | 0.00330033 | 0.00034881 | 18,881 | 0.00504339 | 0.04367550 | 19,722 |
| 579 | 1402 | MADISON ST N E | 0.00002607 | 807 | 0.00036069 | 0.00321486 | 0.00033429 | 18,095 | 0.00489522 | 0.04266207 | 18,902 |
| 580 | 1332 | MADISON ST N E | 0.00002475 | 765 | 0.00034683 | 0.00310992 | 0.00031680 | 17,167 | 0.00471537 | 0.04140213 | 17,932 |
| 581 | 1333 | JEFFERSON ST N E | 0.00002343 | 714 | 0.00039237 | 0.00323565 | 0.00030063 | 15,971 | 0.00548988 | 0.04367286 | 16,685 |
| 582 | 1401 | JEFFERSON ST N E | 0.00002475 | 747 | 0.00041052 | 0.00336006 | 0.00031548 | 16,743 | 0.00574596 | 0.04522617 | 17,490 |
| 583 | 1407 | JEFFERSON ST N E | 0.00002607 | 782 | 0.00042933 | 0.00347853 | 0.00033033 | 17,521 | 0.00600600 | 0.04669533 | 18,303 |
| 584 | 1407 | MONROE ST N E | 0.00002112 | 777 | 0.00042042 | 0.00317625 | 0.00027489 | 17,519 | 0.00580569 | 0.04251489 | 18,296 |
| 585 | 1403 | MONROE ST N E | 0.00002046 | 743 | 0.00040953 | 0.00308220 | 0.00026367 | 16,741 | 0.00566643 | 0.04134174 | 17,483 |
| 586 | 1337 | MONROE ST N E | 0.00001947 | 709 | 0.00039765 | 0.00296406 | 0.00025212 | 15,983 | 0.00549780 | 0.03983265 | 16,692 |
| 587 | 1422 | ASHINGTON ST N E | 0.00001122 | 312 | 0.00025773 | 0.00367752 | 0.00014619 | 7,077 | 0.00346038 | 0.04860768 | 7,389 |
| 588 | 1426 | ASHINGTON ST N E | 0.00001155 | 324 | 0.00027225 | 0.00385869 | 0.00015246 | 7,340 | 0.00364650 | 0.05049264 | 7,664 |
| 589 | 1428 | ASHINGTON ST N E | 0.00001221 | 336 | 0.00028413 | 0.00396396 | 0.00015939 | 7,627 | 0.00381150 | 0.05127441 | 7,963 |
| 590 | 1432 | ASHINGTON ST N E | 0.00001287 | 350 | 0.00029172 | 0.00397518 | 0.00016731 | 7,971 | 0.00395835 | 0.05067051 | 8,322 |
| 591 | 1435 | 6TH ST N E | 0.00001221 | 328 | 0.00028347 | 0.00295878 | 0.00015774 | 7,457 | 0.00401511 | 0.04070715 | 7,785 |
| 592 | 1431 | 6TH ST N E | 0.00001155 | 312 | 0.00025014 | 0.00295053 | 0.00015048 | 7,124 | 0.00356631 | 0.03739263 | 7,436 |
| 593 | 1506 | ASHINGTON ST N E | 0.00001518 | 405 | 0.00032472 | 0.00330165 | 0.00019635 | 9,227 | 0.00462000 | 0.04537038 | 9,632 |
| 594 | 1510 | ASHINGTON ST N E | 0.00001617 | 436 | 0.00039006 | 0.00371316 | 0.00021219 | 9,942 | 0.00544830 | 0.05018574 | 10,378 |
| 595 | 1514 | ASHINGTON ST N E | 0.00001716 | 457 | 0.00042273 | 0.00383196 | 0.00022308 | 10,439 | 0.00584727 | 0.05110974 | 10,896 |
| 596 | 1518 | ASHINGTON ST N E | 0.00001815 | 481 | 0.00044385 | 0.00380127 | 0.00023397 | 10,955 | 0.00606804 | 0.05000193 | 11,436 |
| 597 | 1520 | ASHINGTON ST N E | 0.00001881 | 505 | 0.00045012 | 0.00389961 | 0.00024486 | 11,486 | 0.00606309 | 0.05183376 | 11,991 |
| 598 | 1526 | ASHINGTON ST N E | 0.00001980 | 530 | 0.00043725 | 0.00391875 | 0.00025575 | 12,038 | 0.00579183 | 0.05111238 | 12,568 |
| 599 | 1530 | ASHINGTON ST N E | 0.00002079 | 554 | 0.00040425 | 0.00382371 | 0.00026532 | 12,559 | 0.00528330 | 0.05081637 | 13,113 |
| 600 | 1534 | ASHINGTON ST N E | 0.00002145 | 580 | 0.00036003 | 0.00402039 | 0.00027489 | 13,135 | 0.00459228 | 0.05238651 | 13,715 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|-----------------------------------|------------------------------|------------|----------------|----------------|----------------------|
| 601 | 1538 | ASHINGTON ST N E053-1402924210063 | MICHAEL SOLONYNKA | 55413 | 479690 | 4983454 | 259 |
| 602 | 1602 | ASHINGTON ST N E053-1402924210064 | MARCELLA PECCHIA | 55413 | 479690 | 4983466 | 259 |
| 603 | 1606 | ASHINGTON ST N E053-1402924210065 | J J BARDEN & D C BARDEN | 55413 | 479690 | 4983478 | 259 |
| 604 | 1610 | ASHINGTON ST N E053-1402924210066 | MICHAEL R VENNE | 55413 | 479690 | 4983489 | 259 |
| 605 | 1614 | ASHINGTON ST N E053-1402924210067 | RANDALL C LARSON | 55413 | 479690 | 4983501 | 259 |
| 606 | 1618 | ASHINGTON ST N E053-1402924210068 | MICHAEL J DABROWSKI JR | 55413 | 479690 | 4983513 | 259 |
| 607 | 1622 | ASHINGTON ST N E053-1402924210069 | BEVERLY A PURTLE | 55413 | 479690 | 4983525 | 259 |
| 608 | 1626 | ASHINGTON ST N E053-1402924210070 | KIM F LARSON | 55413 | 479690 | 4983537 | 259 |
| 609 | 1628 | ASHINGTON ST N E053-1402924210071 | KIM F LARSON | 55413 | 479690 | 4983551 | 259 |
| 610 | 1631 | 6TH ST N E 053-1402924210072 | RAND MORTGAGE COMPANY | 55413 | 479645 | 4983551 | 259 |
| 611 | 1627 | 6TH ST N E 053-1402924210073 | PAMELA JEAN HUGHES | 55413 | 479645 | 4983538 | 259 |
| 612 | 1621 | 6TH ST N E 053-1402924210074 | G J BROZYNA & J A HEDDAN | 55413 | 479645 | 4983525 | 259 |
| 613 | 1619 | 6TH ST N E 053-1402924210075 | GREGORY D NYBERG | 55413 | 479645 | 4983513 | 259 |
| 614 | 1615 | 6TH ST N E 053-1402924210076 | B & J BONA | 55413 | 479645 | 4983502 | 259 |
| 615 | 1611 | 6TH ST N E 053-1402924210077 | IRVIN E BERGSAGEL ET AL | 55413 | 479645 | 4983490 | 259 |
| 616 | 1607 | 6TH ST N E 053-1402924210078 | I M KLEBS ET AL W/L EST | 55413 | 479645 | 4983478 | 259 |
| 617 | 1603 | 6TH ST N E 053-1402924210079 | G WDOWYCHYN ET AL W/L EST | 55413 | 479645 | 4983466 | 259 |
| 618 | 1539 | 6TH ST N E 053-1402924210080 | DAVID L BICE | 55413 | 479645 | 4983454 | 259 |
| 619 | 1535 | 6TH ST N E 053-1402924210081 | DOUGLAS A NIELSEN | 55413 | 479645 | 4983442 | 259 |
| 620 | 1531 | 6TH ST N E 053-1402924210082 | TIFFANY R MERCIL | 55413 | 479645 | 4983430 | 259 |
| 621 | 1527 | 6TH ST N E 053-1402924210083 | G WDOWYCHYN ET AL W/L EST | 55413 | 479645 | 4983418 | 259 |
| 622 | 1521 | 6TH ST N E 053-1402924210084 | S P MOSIMAN ET AL W/L EST | 55413 | 479645 | 4983406 | 259 |
| 623 | 1519 | 6TH ST N E 053-1402924210085 | LISA M ELFRINK | 55413 | 479645 | 4983394 | 259 |
| 624 | 1515 | 6TH ST N E 053-1402924210086 | J & J WORWA | 55413 | 479645 | 4983381 | 259 |
| 625 | 1511 | 6TH ST N E 053-1402924210087 | STEVEN H MURPHY | 55413 | 479645 | 4983369 | 259 |
| 626 | 1505 | 6TH ST N E 053-1402924210088 | ROBERT D LUTZ | 55413 | 479645 | 4983357 | 259 |
| 627 | 1501 | 6TH ST N E 053-1402924210089 | DION PROPERTIES | 55413 | 479645 | 4983345 | 259 |
| 628 | 1500 | 6TH ST N E 053-1402924210090 | SCHOOL DIST NO 1 | 55413 | 479562 | 4983406 | 259 |
| 629 | 1606 | 6TH ST N E 053-1402924210091 | ANTHONY J DOBEK | 55413 | 479585 | 4983479 | 260 |
| 630 | 1610 | 6TH ST N E 053-1402924210092 | ELLEN L REID | 55413 | 479585 | 4983490 | 260 |
| 631 | 1614 | 6TH ST N E 053-1402924210093 | MARIA S HOLDEN | 55413 | 479585 | 4983502 | 260 |
| 632 | 1618 | 6TH ST N E 053-1402924210094 | JOHN R SMITH JR | 55413 | 479585 | 4983514 | 260 |
| 633 | 1629 | 5TH ST N E 053-1402924210098 | ST MARYS RUS ORT GRE CATH CH | 55413 | 479539 | 4983540 | 260 |
| 634 | 1619 | 5TH ST N E 053-1402924210099 | J & F L JAROSAK TRUSTEES | 55413 | 479539 | 4983514 | 260 |
| 635 | 1613 | 5TH ST N E 053-1402924210100 | BARBARA J JENNICH | 55413 | 479539 | 4983503 | 260 |
| 636 | 1611 | 5TH ST N E 053-1402924210101 | DANIEL W ULVIN | 55413 | 479539 | 4983491 | 260 |
| 637 | 1605 | 5TH ST N E 053-1402924210102 | CAROL LARSON | 55413 | 479539 | 4983479 | 260 |
| 638 | 1720 | 6TH ST N E 053-1402924210153 | ELIZABETH A ATTEBERRY | 55413 | 479585 | 4983643 | 260 |

| HOUSENO | STREET | PER CONC | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | Total | | |
|---------|--------|------------------|--------------------|-----------|------------|-------------------|------------|-----------|------------|------------|--------|
| | | | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | | |
| 601 | 1538 | ASHINGTON ST N E | 0.00002211 | 606 | 0.00033099 | 0.00398871 | 0.00028347 | 13,694 | 0.00468864 | 0.05068503 | 14,300 |
| 602 | 1602 | ASHINGTON ST N E | 0.00002310 | 633 | 0.00034287 | 0.00422103 | 0.00029172 | 14,262 | 0.00480051 | 0.05665242 | 14,895 |
| 603 | 1606 | ASHINGTON ST N E | 0.00002376 | 656 | 0.00036234 | 0.00452463 | 0.00029799 | 14,723 | 0.00481305 | 0.05943498 | 15,379 |
| 604 | 1610 | ASHINGTON ST N E | 0.00002409 | 675 | 0.00038742 | 0.00455730 | 0.00030261 | 15,096 | 0.00512886 | 0.05829747 | 15,770 |
| 605 | 1614 | ASHINGTON ST N E | 0.00002442 | 695 | 0.00041151 | 0.00428769 | 0.00030657 | 15,476 | 0.00544599 | 0.05503410 | 16,171 |
| 606 | 1618 | ASHINGTON ST N E | 0.00002475 | 714 | 0.00043197 | 0.00455730 | 0.00030954 | 15,846 | 0.00571395 | 0.05727876 | 16,560 |
| 607 | 1622 | ASHINGTON ST N E | 0.00002508 | 733 | 0.00044418 | 0.00521994 | 0.00031251 | 16,242 | 0.00588555 | 0.06309666 | 16,975 |
| 608 | 1626 | ASHINGTON ST N E | 0.00002541 | 752 | 0.00045111 | 0.00554829 | 0.00031515 | 16,626 | 0.00600798 | 0.06423648 | 17,378 |
| 609 | 1628 | ASHINGTON ST N E | 0.00002574 | 771 | 0.00044286 | 0.00538890 | 0.00031746 | 17,010 | 0.00591129 | 0.06063057 | 17,781 |
| 610 | 1631 | 6TH ST N E | 0.00001980 | 625 | 0.00035277 | 0.00431970 | 0.00024783 | 13,725 | 0.00461934 | 0.05606172 | 14,350 |
| 611 | 1627 | 6TH ST N E | 0.00001980 | 614 | 0.00034023 | 0.00453651 | 0.00024717 | 13,545 | 0.00457710 | 0.05451699 | 14,159 |
| 612 | 1621 | 6TH ST N E | 0.00001980 | 602 | 0.00034782 | 0.00490578 | 0.00024585 | 13,308 | 0.00466521 | 0.05767113 | 13,910 |
| 613 | 1619 | 6TH ST N E | 0.00001947 | 589 | 0.00034782 | 0.00490842 | 0.00024420 | 13,032 | 0.00464706 | 0.05959305 | 13,622 |
| 614 | 1615 | 6TH ST N E | 0.00001947 | 575 | 0.00034419 | 0.00460383 | 0.00024189 | 12,727 | 0.00457875 | 0.05763021 | 13,302 |
| 615 | 1611 | 6TH ST N E | 0.00001914 | 564 | 0.00033627 | 0.00409266 | 0.00024090 | 12,527 | 0.00446226 | 0.05265051 | 13,092 |
| 616 | 1607 | 6TH ST N E | 0.00001914 | 549 | 0.00032307 | 0.00357258 | 0.00023826 | 12,211 | 0.00428010 | 0.04630923 | 12,760 |
| 617 | 1603 | 6TH ST N E | 0.00001881 | 537 | 0.00030690 | 0.00384549 | 0.00023628 | 11,999 | 0.00406362 | 0.04969338 | 12,536 |
| 618 | 1539 | 6TH ST N E | 0.00001848 | 524 | 0.00028908 | 0.00391017 | 0.00023364 | 11,753 | 0.00383889 | 0.05162817 | 12,277 |
| 619 | 1535 | 6TH ST N E | 0.00001815 | 507 | 0.00027258 | 0.00375804 | 0.00022935 | 11,407 | 0.00374847 | 0.05052828 | 11,914 |
| 620 | 1531 | 6TH ST N E | 0.00001749 | 491 | 0.00026862 | 0.00343431 | 0.00022473 | 11,056 | 0.00378048 | 0.04691049 | 11,547 |
| 621 | 1527 | 6TH ST N E | 0.00001716 | 473 | 0.00025707 | 0.00347853 | 0.00021912 | 10,682 | 0.00365211 | 0.04541493 | 11,155 |
| 622 | 1521 | 6TH ST N E | 0.00001650 | 453 | 0.00029469 | 0.00346434 | 0.00021219 | 10,227 | 0.00380391 | 0.04603566 | 10,679 |
| 623 | 1519 | 6TH ST N E | 0.00001617 | 436 | 0.00032637 | 0.00329967 | 0.00020625 | 9,876 | 0.00429330 | 0.04447839 | 10,312 |
| 624 | 1515 | 6TH ST N E | 0.00001551 | 419 | 0.00035046 | 0.00333894 | 0.00019998 | 9,512 | 0.00466389 | 0.04414146 | 9,931 |
| 625 | 1511 | 6TH ST N E | 0.00001485 | 403 | 0.00036300 | 0.00335412 | 0.00019305 | 9,144 | 0.00488598 | 0.04496514 | 9,546 |
| 626 | 1505 | 6TH ST N E | 0.00001419 | 385 | 0.00036267 | 0.00324192 | 0.00018546 | 8,758 | 0.00494670 | 0.04399725 | 9,142 |
| 627 | 1501 | 6TH ST N E | 0.00001353 | 368 | 0.00035145 | 0.00324951 | 0.00017754 | 8,379 | 0.00484308 | 0.04354317 | 8,748 |
| 628 | 1500 | 6TH ST N E | 0.00001254 | 364 | 0.00021219 | 0.00300927 | 0.00015873 | 8,136 | 0.00270237 | 0.04027551 | 8,499 |
| 629 | 1606 | 6TH ST N E | 0.00001452 | 444 | 0.00026004 | 0.00421443 | 0.00018315 | 9,825 | 0.00348546 | 0.05392431 | 10,269 |
| 630 | 1610 | 6TH ST N E | 0.00001485 | 453 | 0.00026169 | 0.00435831 | 0.00018414 | 9,997 | 0.00352077 | 0.05461005 | 10,450 |
| 631 | 1614 | 6TH ST N E | 0.00001485 | 457 | 0.00026070 | 0.00428307 | 0.00018447 | 10,098 | 0.00352704 | 0.05251389 | 10,555 |
| 632 | 1618 | 6TH ST N E | 0.00001485 | 467 | 0.00027423 | 0.00398871 | 0.00018579 | 10,298 | 0.00374187 | 0.04780116 | 10,765 |
| 633 | 1629 | 5TH ST N E | 0.00001254 | 409 | 0.00024420 | 0.00284856 | 0.00015510 | 8,948 | 0.00323697 | 0.03666630 | 9,356 |
| 634 | 1619 | 5TH ST N E | 0.00001221 | 398 | 0.00024651 | 0.00319044 | 0.00015411 | 8,746 | 0.00331122 | 0.04260036 | 9,144 |
| 635 | 1613 | 5TH ST N E | 0.00001221 | 391 | 0.00024288 | 0.00335940 | 0.00015279 | 8,591 | 0.00330330 | 0.04187073 | 8,982 |
| 636 | 1611 | 5TH ST N E | 0.00001221 | 384 | 0.00022935 | 0.00367455 | 0.00015213 | 8,465 | 0.00316272 | 0.04542186 | 8,848 |
| 637 | 1605 | 5TH ST N E | 0.00001221 | 380 | 0.00021516 | 0.00386793 | 0.00015213 | 8,407 | 0.00291687 | 0.04870569 | 8,787 |
| 638 | 1720 | 6TH ST N E | 0.00001518 | 511 | 0.00046662 | 0.00309738 | 0.00019074 | 11,141 | 0.00637065 | 0.04083123 | 11,652 |

| <u>HOUSENO</u> | <u>STREET</u> | <u>PIN</u> | <u>NAME</u> | <u>ZIP</u> | <u>X COORD</u> | <u>Y COORD</u> | <u>ELEVATION (M)</u> |
|----------------|---------------|------------------|---|------------|----------------|----------------|----------------------|
| 639 | 1721 | 5TH ST N E | 053-1402924210154 ELIZABETH MANGEN | 55413 | 479539 | 4983647 | 261 |
| 640 | 1719 | 5TH ST N E | 053-1402924210155 E J RAJTA ET AL SUBJ/LE | 55413 | 479539 | 4983634 | 261 |
| 641 | 1715 | 5TH ST N E | 053-1402924210156 A J SOUCEK & M J MALONE | 55413 | 479539 | 4983622 | 260 |
| 642 | 1701 | 5TH ST N E | 053-1402924210157 ST MARYS RUSSIAN ORTH GR CH | 55413 | 479539 | 4983598 | 260 |
| 643 | 613 | 17TH AVE N E | 053-1402924210158 W L & A M ZELINSKI | 55413 | 479677 | 4983585 | 259 |
| 644 | 1700 | ASHINGTON ST N E | 053-1402924210159 HILDEGARD ESTUM | 55413 | 479697 | 4983585 | 259 |
| 645 | 1706 | ASHINGTON ST N E | 053-1402924210160 T A BRAMA & J J BRAMA | 55413 | 479690 | 4983598 | 259 |
| 646 | 1710 | ASHINGTON ST N E | 053-1402924210161 TAMMIE L FORMICO | 55413 | 479690 | 4983609 | 259 |
| 647 | 1714 | ASHINGTON ST N E | 053-1402924210162 JAMES J HARTWIG ETAL | 55413 | 479690 | 4983621 | 259 |
| 648 | 1718 | ASHINGTON ST N E | 053-1402924210163 S A WAKARUK & K M WAKARUK | 55413 | 479690 | 4983633 | 260 |
| 649 | 1720 | ASHINGTON ST N E | 053-1402924210164 L & R SCHLEICHER | 55413 | 479690 | 4983643 | 260 |
| 650 | 1719 | 6TH ST N E | 053-1402924210165 RUTH KIRSTIUK | 55413 | 479645 | 4983637 | 260 |
| 651 | 1715 | 6TH ST N E | 053-1402924210166 T G KELLER & V A KELLER | 55413 | 479645 | 4983621 | 260 |
| 652 | 1709 | 6TH ST N E | 053-1402924210167 MARIE KOSTELNIK | 55413 | 479645 | 4983609 | 260 |
| 653 | 609 | 17TH AVE N E | 053-1402924210168 DOLORES K BAKUN | 55413 | 479655 | 4983591 | 259 |
| 654 | 601 | 17TH AVE N E | 053-1402924210169 R V MORITZ & M J MORITZ | 55413 | 479634 | 4983591 | 260 |
| 655 | 1710 | 6TH ST N E | 053-1402924210198 ST MARYS GREEK CATH CHURCH | 55413 | 479585 | 4983610 | 260 |
| 656 | 1620 | 6TH ST N E | 053-1402924210200 ST MARYS ORTHODOX CATHEDRAL | 55413 | 479585 | 4983539 | 260 |

| HOUSENO | STREET | POST-BAGHOUSE CASE | | | PRE-BAGHOUSE CASE | | | <u>Total</u> | | | |
|---------|--------|--------------------|------------|-----------|-------------------|------------|------------|--------------|------------|------------|--------|
| | | PER CONC | 72-89DEP | 24HR CONC | 1HR CONC | PER CONC | 36-72DEP | 24HR CONC | 1HR CONC | 36-89DEP | |
| 639 | 1721 | 5TH ST N E | 0.00001254 | 425 | 0.00041349 | 0.00279510 | 0.00015774 | 9,278 | 0.00566247 | 0.03714711 | 9,704 |
| 640 | 1719 | 5TH ST N E | 0.00001254 | 425 | 0.00038940 | 0.00277101 | 0.00015774 | 9,280 | 0.00538428 | 0.03700389 | 9,706 |
| 641 | 1715 | 5TH ST N E | 0.00001254 | 424 | 0.00034947 | 0.00280302 | 0.00015675 | 9,241 | 0.00487344 | 0.03752529 | 9,665 |
| 642 | 1701 | 5TH ST N E | 0.00001254 | 422 | 0.00025872 | 0.00321750 | 0.00015609 | 9,173 | 0.00365046 | 0.04128465 | 9,595 |
| 643 | 613 | 17TH AVE N E | 0.00002409 | 759 | 0.00040986 | 0.00429033 | 0.00029799 | 16,586 | 0.00524007 | 0.05607294 | 17,346 |
| 644 | 1700 | ASHINGTON ST N E | 0.00002739 | 845 | 0.00046134 | 0.00481932 | 0.00033660 | 18,513 | 0.00589380 | 0.06023193 | 19,358 |
| 645 | 1706 | ASHINGTON ST N E | 0.00002640 | 828 | 0.00040392 | 0.00451803 | 0.00032472 | 18,081 | 0.00504768 | 0.05897661 | 18,909 |
| 646 | 1710 | ASHINGTON ST N E | 0.00002640 | 833 | 0.00040326 | 0.00468369 | 0.00032406 | 18,135 | 0.00569151 | 0.05778861 | 18,968 |
| 647 | 1714 | ASHINGTON ST N E | 0.00002640 | 842 | 0.00050655 | 0.00485430 | 0.00032604 | 18,343 | 0.00713724 | 0.05714577 | 19,185 |
| 648 | 1718 | ASHINGTON ST N E | 0.00002673 | 851 | 0.00062832 | 0.00470019 | 0.00033033 | 18,553 | 0.00872850 | 0.06154830 | 19,403 |
| 649 | 1720 | ASHINGTON ST N E | 0.00002673 | 853 | 0.00070323 | 0.00473616 | 0.00033132 | 18,598 | 0.00962907 | 0.06026922 | 19,451 |
| 650 | 1719 | 6TH ST N E | 0.00002046 | 671 | 0.00055638 | 0.00398475 | 0.00025575 | 14,638 | 0.00766293 | 0.05176875 | 15,309 |
| 651 | 1715 | 6TH ST N E | 0.00002046 | 669 | 0.00046101 | 0.00416559 | 0.00025509 | 14,575 | 0.00647724 | 0.05110050 | 15,244 |
| 652 | 1709 | 6TH ST N E | 0.00002046 | 664 | 0.00036993 | 0.00438504 | 0.00025377 | 14,462 | 0.00522588 | 0.05465394 | 15,126 |
| 653 | 609 | 17TH AVE N E | 0.00002145 | 685 | 0.00033330 | 0.00397221 | 0.00026466 | 14,945 | 0.00416559 | 0.05218026 | 15,631 |
| 654 | 601 | 17TH AVE N E | 0.00001947 | 626 | 0.00029898 | 0.00387882 | 0.00024057 | 13,672 | 0.00383394 | 0.05065434 | 14,298 |
| 655 | 1710 | 6TH ST N E | 0.00001518 | 510 | 0.00033726 | 0.00358974 | 0.00019074 | 11,098 | 0.00476289 | 0.04499748 | 11,608 |
| 656 | 1620 | 6TH ST N E | 0.00001485 | 484 | 0.00028677 | 0.00361383 | 0.00018777 | 10,623 | 0.00380061 | 0.04715832 | 11,106 |

**Attachments 4 and 5 in
electronic format only**

Attachment 6 – Responses to Comments

Thank you for your comments on my draft air dispersion modeling study for the Western Mineral Products site. The comments will help me to improve the study so that it will better serve your needs. I would like to take this opportunity to respond to each of your comments.

Specific Comments:

- Page 1, 2nd paragraph: Clarification - there were two expanding furnaces, each served by a fifty foot stack (and ultimately two baghouse filters).
The modeled facility was characterized with two expanding furnaces, but the text was inaccurate and has been corrected..
- Page 2, 1st full paragraph: Can you clarify or explain further why the amount of particle emissions appears to be larger than that reported in the emissions inventory reports for 1977 and 1985? Is this based on your knowledge of the specific type of baghouse filters used at the plant?
I have included further discussion to address this point. In short, it is a judgement call, but I deemed the operating permit and other documents to be a better source of information than the emissions inventory reports.
- Page 2, 2nd paragraph: Would not the difference between the upper and lower bound estimates of tremolite emissions be on the order of four times, and not one order of magnitude as indicated (ie. 15 x 1 to 20 x 3)?
No, the stack emissions calculations are shown in Attachment 1. The baghouse loading of 15 to 20 lb/hr of PM₁₀ is first modified by the baghouse efficiency to give PM₁₀ emissions. The PM₁₀ emissions range from 0.33 to 0.88 tons per year (tpy) for the post-baghouse case and from 9.86 to 13.14 tpy for the pre-baghouse case. These emissions are then further modified by the percentage of tremolite fibers (1-3%) to give the emission rate of the fibers. The tremolite fiber emissions range over about one order of magnitude for each of the two cases.
- Page 2, 3rd paragraph: Is the use of one-half the rail unloading emission factor for the truck and rail loading emission factor a standard modeling assumption?
No, there is no emission factor for the truck and rail loading, so the selection of an emission rate is a judgement call. I assumed that since the product would be in a packaged form, the emissions would be significantly reduced, but there is no quantitative basis for

Attachment 6 – Responses to Comments

choosing a particular value.

- Page 3, 4th paragraph: Please clarify the units used in Figures 4-11.
Done.
- Page 3, 5th paragraph: Is there an explanation for the nearly uniform, circular pattern of the concentration isopleths? Is it related to some feature unique to the site, or is it a common occurrence?
The circular pattern is not especially unusual, especially for a facility with several fugitive sources such as this. The dispersion pattern from a Gaussian plume model for a single tall stack would be quite different, however, with lobes extending out in the directions of the predominant winds.
- Page 4, Table 1: Are the deposition results per year, or total for the time period?
The deposition results are the total for the time period, pre-1972 or post-1972.
- Page 5, 4th full paragraph: The tremolite ranges listed are for various waste materials produced at the plant. We do know the rough tremolite concentration in the raw ore shipped to the plant on an annual basis, which I may have provided to you in a table, and have also attached to this memo. From this data I calculated an average weighted percentage of tremolite asbestos in the ore shipped to the plant of 4.38% for the time period of 1958 - 1971, and 3.53% for the time period of 1972 - 1988. This data is useful in adjusting the emission rate from the rail unloading area (as it appears you have done), but it is unclear how it could be used to adjust the stack emission estimates.
The situation is as you describe, and I concur with your assessment.
- Figure 3: The monokote mixer stack (stack 3) was likely located on the cement block building, and not adjacent to the two furnace stacks. This may nor may not have any real bearing on the results.
I have relocated the stack accordingly, and since remodelling is required due to changes in the estimated emissions, the modified location of the monokote mixer stack will be included.
- Attachment 1: For Stack 3, the upper bound tremolite concentration would be 3%, not 1% as listed. The lower bound is correct at 0.5%.
The correction has been made.
- Attachment 2: The density of asbestos fibers as listed by EPA is 3.3 x

Attachment 6 – Responses to Comments

10^7 fibers per milligram. This should be the basis for calculating fiber concentrations in air.

This conversion factor will be used.

- Attachment 2: The tremolite concentration ranges for the various fugitive dust sources should be as follows:

Rail unloading: 3.67% to 5.16% for pre-1972 (4.38% overall weighted average)

2.85% to 3.94% for post-1972 (3.52 overall weighted average)

Rail loading: 0.5% to 3% for entire time period (this is the tremolite concentration of finished vermiculite).

Waste pile: 2% to 10% for the entire time period (tremolite concentration of stoner rock pile).

Truck loading: 0.5% to 3% for entire time period (this is the tremolite concentration of finished vermiculite).

Unpaved loading area 0.05% to 8% may be a more realistic range based on additional soil samples collected in this area.

These adjustments have been made.

General comments:

- For the pre-baghouse scenario, the air pollution control equipment used was a primary cyclone with an estimated particulate removal efficiency of 85%. Would such equipment have an 85% efficiency for removal of the much smaller tremolite asbestos fibers? Perhaps a third scenario with no pollution control equipment should be run as a true "worst-case" scenario.
It is true that a cyclone will have a greater efficiency for larger particles. The 85% value is typically applied to the PM₁₀ fraction. The tremolite fibers have typical dimensions on the order of 0.5 micrometers (um) in diameter by 25 um in length. Since the fibers tend to align themselves lengthwise in an air flow, they might be considered to be in the smaller end of the PM₁₀ range. On the other hand, since the fibers are elongated and have a greater mass than a spherical 0.5 um particle, it is likely that more of the fibers are removed by a cyclone than if the fibers were spherical 0.5 um particles. The exact cut-point for the tremolite fibers in the cyclone is unknown. One could assume some smaller removal rate, but it would only be a guess.
- Does the model include deposition in its calculation of airborne concentrations as you move away from the plant (i.e. are concentrations reduced by the amount of deposition in addition to simple dispersion effects)?
No, plume-depletion by deposition was not included. EPA modeling guidelines recommend against using plume-depletion for two reasons. The plume-depletion algorithm has not been well-validated, and ignoring plume-depletion gives a measure of 'conservatism' to the analysis. In addition, using the plume-depletion algorithm increases model run time considerably.
- We would like to see units on the Figures be in fibers per cc instead of micrograms per cubic meter.
This will be done.
- Can a map showing total estimated deposition for the time period 1958-1988 be generated?
This will be done.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 21 2000

REPLY TO THE ATTENTION OF: SE-5J

ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action approval at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief *R. Karl*
Emergency Response Branch

I. PURPOSE

The purpose of this action memorandum is to request and document approval to expend up to \$898,200 to conduct a time-critical removal action at the Western Mineral Products Site located in Minneapolis, Hennepin County, Minnesota. Specifically, the proposed removal action will address the contaminated residential properties surrounding the industrial portion of the site.

This removal action addresses the need to mitigate the threats to the local population and the environment posed by fibrous amphibole asbestos that was released into the environment from the industrial portion of the site as a result of the processing of vermiculite ore and disposal of associated waste products. High concentrations of amphibole asbestos posing a public health threat have been detected on and in the areas surrounding the former Western Mineral Products/W.R. Grace property and on the adjacent Electramatic property. These properties are herein referred to as the industrial sites. Also, high concentrations of amphibole asbestos have been detected in the residential areas (residential sites) surrounding the industrial sites.

The proposed removal action will address immediate health threats identified in the residential areas during EPA's sampling in Northeast Minneapolis which occurred from March through



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August 2000. EPA plans to conduct further sampling at the residential sites which surround the industrial site and in other areas that may have been impacted by the vermiculite processing operations at the Site. This subsequent sampling, analysis and evaluation may identify additional time-critical threats at other residential sites.

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

The industrial sites are located at 1720 Madison Street N.E. and 1815 Jefferson Street N.E., Minneapolis, Hennepin County, Minnesota, and are bordered on the east by Burlington Northern Santa Fe railroad tracks, on the north by commercial buildings and west by residential properties and a city maintenance facility, and on the south by a commercial building.

The industrial sites consist of two parcels of land, one currently owned by Madison Complex, Inc. and the other currently owned by Electramatic, Inc. The site is occupied by a three-story brick office building, a brick warehouse structure, two four-story silos, and the Electramatic building to the north. The remaining portions of the industrial sites are parking lots and an abandoned section of 18th Street that divides the two parcels of land. The abandoned section of 18th Street is now owned by Electramatic and Madison Complex.

Western Mineral Products Company, a Minnesota company, operated at 1720 Madison Street N.E. as an independent company from 1946 to 1966. During part of this time it was a licensee of the Zonolite Company, a Montana Company. W.R. Grace acquired the Zonolite Company through a merger on April 16, 1963. The property at 1720 Madison was sold by W.R. Grace to Madison Complex, Inc, on October 24, 1989 by deed dated September 29, 1989. Allegedly, in 1990, W.R. Grace removed all materials that were stored in the two silos. The property at 1720 Madison is currently leased to Panel Specialties, Inc.(PSI), which manufactures prison furniture and security equipment on the property.

The Western Mineral Products Site at 1720 Madison Street N.E. processed vermiculite

ore that was shipped from the mine in Libby, Montana. The vermiculite ore body in Libby, Montana also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

At the mine in Libby, Montana, the vermiculite ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products.

The Western Mineral Products site in Minneapolis, Minnesota received Libby ore by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process contained high concentrations of amphibole asbestos. This waste product, also known as "Stoner Rock", was placed outside the building in a pile and was labeled as "Free Crushed Rock". The residents in the neighborhood were encouraged to take the waste material to use as fill on their properties. Residents hauled the "Free Crushed Rock" to their homes in their pickup trucks and cars. Allegedly the asbestos contaminated material was place in yards, gardens, sandboxes, and barbecue grills. This practice may have occurred for more than 40 years.

B. Removal Site Assessment

Between February and August 2000, the U.S. EPA Emergency Response Branch conducted site assessment activities to determine the potential health threat posed by amphibole asbestos-containing wastes which were produced at the former Western Mineral Products/W.R.Grace facility at 1720 Madison and deposited outside the plant and on residential properties in the surrounding neighborhood.

As part of a national evaluation of facilities that received vermiculite ore from the Libby,

Montana mine, the U.S. Environmental Protection Agency (EPA) Region 5 Emergency Response Branch conducted an initial site visit on February 2, 2000. The initial investigation consisted of a brief inspection and sampling of the former processing building and property, and interviews with State and local officials and some members businesses operating in the area.

During the investigation EPA observed exfoliated vermiculite insulation inside the building in a ceiling area on the first floor. Also, there was visible vermiculite in the surface soils around the building. Samples were collected from these areas and were analyzed using polarized light microscopy (PLM) and transmission electron microscopy (TEM). These samples indicated trace amounts of asbestos at concentrations less than 1% by visual estimate. On April 13, 2000, U.S. EPA returned to the site to perform additional of the surface soil and indoor insulation. While the indoor samples did not detect any asbestos, the three soil samples indicated levels between 2 % and 20 % asbestos. This finding triggered additional investigatory work and also a public meeting at the nearby armory in Northeast Minneapolis on April 13, 2000. At public meeting the local residents and the news media were updated on the national and local investigation of the vermiculite sites associated with the Libby, Montana mine. At the public meeting many residents expressed their concern with the adverse health effects associated with the Western Mineral Products site. Many of the former workers from the Site have contracted asbestosis or mesothelioma, both asbestos-related diseases.

These findings led EPA to initiate a residential property investigation with the following goals:

1. Visually identify asbestos contamination in alleys and yards;
2. Sample and analyze residential areas for asbestos;
3. Conduct door-to-door community outreach to determine the extent of contamination in the residential areas around the site.

In June and July 2000, the EPA collected soil samples from alleys in the residential areas as part of the residential investigation and extent of contamination study (See Figure 1). Visible amphibole asbestos was observed and confirmed through laboratory analysis in the alleys and adjacent yards. Concentrations of asbestos as high as 95% were confirmed in samples taken from the concrete surface of the alleys. Because the Stoner Rock waste material was made readily available to the general public, EPA expects that other contaminated residences will be identified.

It has been the experience of EPA Region 8 that laboratories that were contracted to perform this analysis reported some difficulty in reading the samples due to the matrix and

Western Mineral Site

Vicinity of 1720 Madison Street NE

Minneapolis, Minnesota

Legend

- Grab Samples August 1-2, 2000
- Grab Samples June 20-22, 2000
- Visually Inspected August 1-2, 2000
- Industrial Site

N



0.2 0 0.2 0.4 Miles



Preliminary Map
Coordinate System
UTM Zone 15, NAD 83

Sample Locations for August 1-2, 2000
supported by GPS Locational Data

the long thin nature of the amphibole asbestos. As a result labs indicated that they were likely under reporting asbestos concentrations.

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the National Contingency Plan (NCP). Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Characteristics of amphibole asbestos that are of concern are in the range of greater than 5 microns in length and have an aspect ratio of greater than 5 to 1.

C. Community characteristics

The Environmental Justice (EJ) Analysis indicated that the site is located in census tract 0025, block group 1, with a population of 376. To meet the EJ concern criteria, the area within 1-mile of the site must have a population that is twice the state low income percentage and/or twice the state minority percentage. For this site, the area must be at least 54% low-income and/or at least 12% minority. At this site, the low-income percentage is 55.1%, and the minority percentage is 19.7%. Therefore this site does meet the region's EJ criteria based on demographics as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998".

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to residents exists through direct contact and subsequent inhalation of amphibole asbestos which is currently in the alley's and yards of residential properties around the Site. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances; The large concentrations of asbestos found in the residential alley's and in surface soils in yards indicate that the human exposure

pathway exists. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

Given the occurrences of documented cases of asbestos related disease and death associated with handling of the ore, vermiculite product, and wastes from the Western Mineral site, it is reasonable to conclude that this known exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist (see Attachment 3).

(iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate; Vermiculite and pieces of amphibole asbestos are visible at the surface at both the industrial site and residential sites. Surface soils at both the industrial and residential sites contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures. Contaminated soils can easily be tracked into buildings or off the contaminated properties by truck, automobile, bicycle, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated surface soils. Rainfall and snow melt would also tend to wash the fibers off of the residential yards onto the adjacent alley's and to the nearby streets and sewers where they could also become airborne.

There is documentation that in the past, area residents would remove bulk waste vermiculite that had been abandoned by Grace at the industrial site to use as fill around their homes. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the area around the site and possibly on residential sites in the suburbs surrounding Minneapolis. Residents and newspaper reports indicate that from the 1940's through the 1980's children in the neighborhood played in the large pile of waste vermiculite that was labeled "Free Crushed Rock" by W.R.Grace.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund

sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994).

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; The warmer temperatures and dry weather typical in the summer and fall months in Minneapolis will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further from the yards to the alley's to the streets.

(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release; No other Local, State, or Federal agency is in the position or currently has the resources to independently implement an effective response action to address the on-going threats presented at the residential sites. EPA will conduct its actions in cooperation with State and local authorities. The Minnesota Pollution Control Agency (MPCA) is the lead oversight agency for the cleanup of the industrial site under their voluntary cleanup program.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous nature of minerals found at the Western Mineral Products Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former plant workers, their families, and to nearby residents with no known occupational or family connection to the vermiculite processing operations in Minneapolis. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions are outlined below. The removal will involve the following:

- a. Develop and implement a site health and safety plan;
- b. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- c. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alley's;
- d. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- e. Remove and dispose of asbestos from the surface of the paved alley's and driveways;
- f. Perform personal air sampling and ambient air sampling during remediation activities;
- g. Implement engineering measures to control dust during the cleanup;
- h. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- i. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- j. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. This project is estimated to take 40 days to complete assuming that 30 residential properties require remediation.

For the purposes of this initial removal action, cleanups will be initiated at properties with asbestos contamination levels of 1% or greater. Surface soils with detectable levels of contamination will be removed. The excavation depth will be approximately 18 inches.

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for

post-removal site controls at the disposal site to ensure the long-term integrity of the removal. EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

As this cleanup is being conducted as a Time-Critical Removal Action, all Federal and State ARARs may not have been identified at this time. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for piles of unexpanded vermiculite, contaminated soils, or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during this Removal Action.

B. Estimated Costs

The following cost estimates include costs associated with the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated anticipating that the project will need to be performed as a fund lead action. The costs do not include any past or future investigation costs on the Site. Costs are projected as follows:

EXTRAMURAL COSTS

| | |
|------------------------------|------------|
| Cleanup Contractor Costs | \$ 645,000 |
| Contingency (15%) | \$ 96,750 |
| Subtotal | \$ 741,750 |
| START | \$ 30,250 |
| Extramural Subtotal | \$ 772,000 |
| Extramural Contingency (10%) | \$ 77,200 |
| TOTAL, EXTRAMURAL COSTS | \$ 849,200 |

INTRAMURAL COSTS

| | |
|--|-----------------------|
| U.S. EPA Direct Costs \$30 x (500 Regional Hours + 50 H.Q. hours) | \$ 16,500 |
| U.S. EPA Indirect Costs \$65 x 500 Regional Hours | \$ 32,500 |
| TOTAL INTRAMURAL COSTS | \$ 49,000 |
| TOTAL PROJECT CEILING | \$ 898,200 |

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected initial Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommended. The total project ceiling, if approved, will be \$ 898,200. Of this, \$ 818,950 may be used for cleanup contractor costs. You may indicate your decision by signing below.

APPROVE:

for


William E. Muno, Director
Superfund Division

Date:

7/21/00

DISAPPROVE:

William E. Muno, Director
Superfund Division

Date:

Attachments:

- Figure 1 - Site and Residential Sample Location Map
- Attachment 1 - Cleanup Contractor Costs
- Attachment 2 - Administrative Record Index
- Attachment 3 - EPA Toxicologist's Memorandum
- Attachment 4 - Confidential Enforcement Attachment
- Attachment 5 - Environmental Justice Analysis